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I, KAY WARD, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PQ 2206 for a patent by PETER RAFFAELE and MICHAEL RAFFAELE filed on 13 August 1999.

WITNESS my hand this
Eleventh day of April 2000

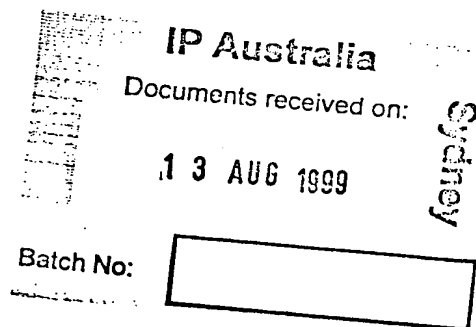
A handwritten signature in cursive script, appearing to read 'Kay Ward'.

KAY WARD
TEAM LEADER EXAMINATION
SUPPORT AND SALES



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This invention relates to improvements to fluid devices more particularly to devices colloquially known as scotch yoke engines. We have lodged a number of applications in respect of these matters namely PP9266, pp9306, pp9573, PQ0287, Pq0795, PQ0895 PQ0989, PQ1653, Pq1654, and others, these applications we incorporate herein.



Figures 1 through to 70 are top view of piston looking down through piston towards the crank. The pictures are non-limiting embodiments of our earlier inventions relating to scotch yoke type fluid devices in which the sliding engagement means are located close together and to one side of the big end.

The pictures depict appropriate locales in relationship to the piston 2, for the piston mounted guide means 8, the crank axis 1, the longitudinal edge of the slider path 5, the maximum total slider travel 4, and a plane perpendicular to the crank axis 3.

The piston mounted guide means may be understood to be mounted either on or part of the piston structure or part of the conrod structure.

Figure 71 and 72 are polar views of crank axis 1, depicting the maximum slider travel 4, the piston 2.

Figures 73, 74, 75, 788, are polar end views of the crank axis of a fluid machine according to the invention. In these pictures is depicted a preferred embodiment of the invention wherein the device has two pistons 2, reciprocating in their respective cylinders in a V configuration. The pistons are equipped with guide means 8, said means are able to enter and depart the volume that is swept by the big end as it orbits the main axis 1. The guide means 8, fit between the crank webs 16 without interfering with the crank webs.

This is an important improvement in that it allows the pistons guide means to support the pistons path all the way down the bore whilst having a very short deck height compared to an arrangement that would have the guide means extending downwards of the piston crown but stopping short of extending past the horizontal slide way means that are responsible for guiding the slider

backwards and forwards as it orbits the crank axis. In looking at the figures 73, 74, 75, 788, one can see that the piston mounted guide means dip in and out of the swept big end volume. Also if the guide means 8, were located out board of the crank webs 16 instead of as depicted a useful embodiment would be formed as well, in fact a set of means 8, could reside inboard of webs 16, and in the same fluid device a other means 8, could reside out board of the web.

Figures 76, 77, 77, 78, 79, depict isometric views of the device of pictures 73, 74, 75, 788, one can see that the means 8, are located inboard of the crank webs 16, and that they may reciprocated in and out of the swept big end volume with out interfering with the crank webs or the big end or the slider or the sundry other parts depicted and elaborated in our earlier applications. We hereby import our earlier applications lodged regarding scotch yoke type devices for use herein and for reference herein. Figures 80A, through to 82, depict a means for stabilising the slider in its orbit. This stabilization is achieved by addind to the slider at least one pivot 19, connecting it by means of connecting means 22, to pivot 19, which is connected to guided sliding assembly 20,23, which is mounted for sliding in guide means 21. As the slider orbits the main axis it causes the connecting means 22 to pivot about pivots 19 and because 22 is a non elastic member it causes 20 to slide up and down in guide block 21, the slider must stay in correct relationship with the members 22 and 20 because of the essential geometry of the devise as depicted.

Figures 83 through to 88 are examples of fluid devices according to our invention that have the slider 5,

mounted on one side of big end 2, which orbits a crank axis 1, wherein the piston 3, or at least one piston is mounted for reciprocation in a cylinder on the opposite side of the big end compared to the slider. Two pistons may be mounted horizontally disposed about the axis 1, and they may be mounted to a slider 5 that is located to one side of the big end and hence closer to on piston than the other so to speak.

fig 1

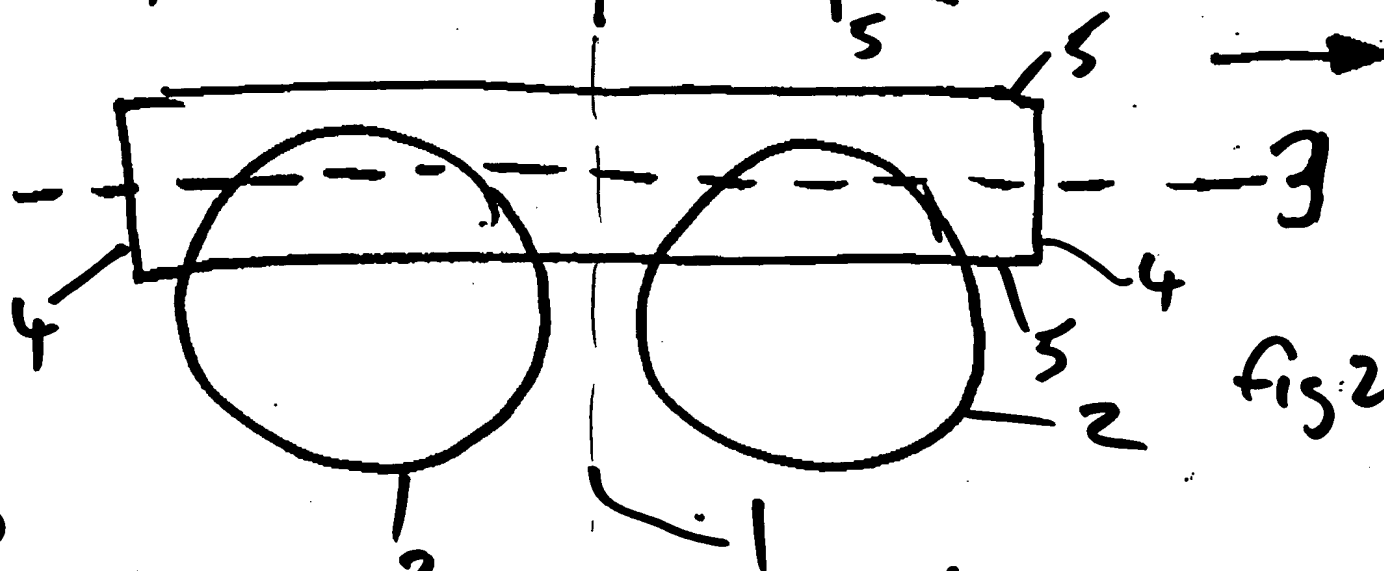
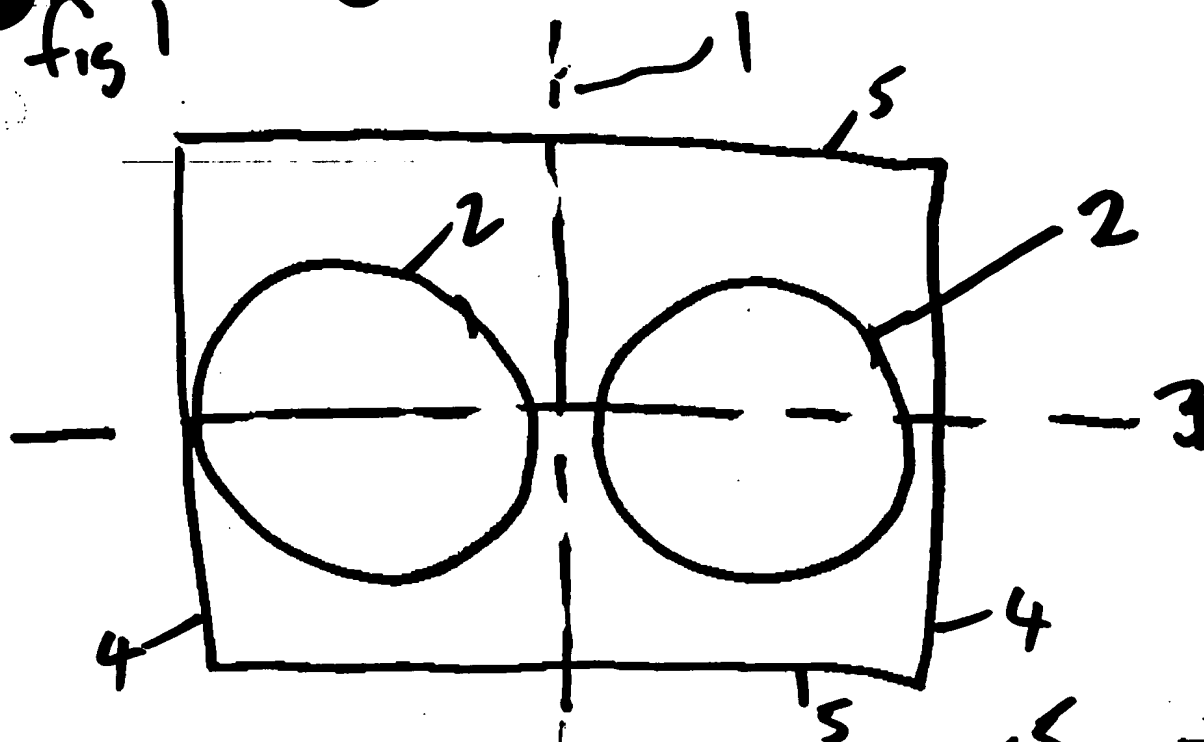


fig 2

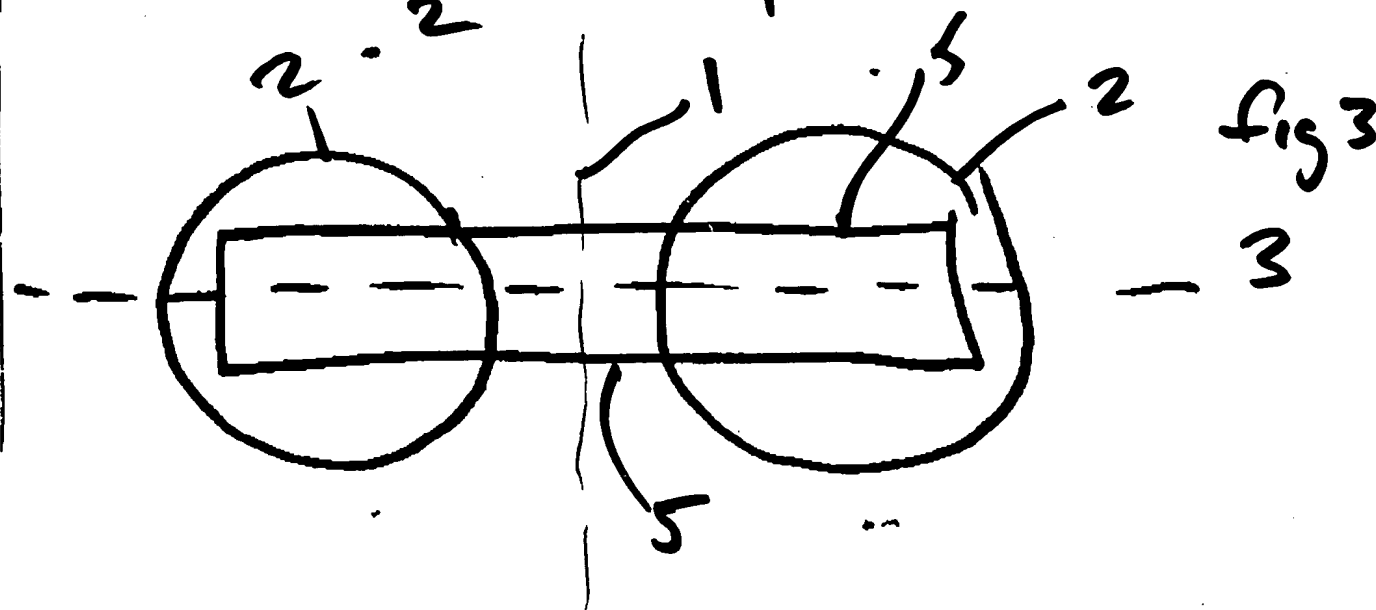
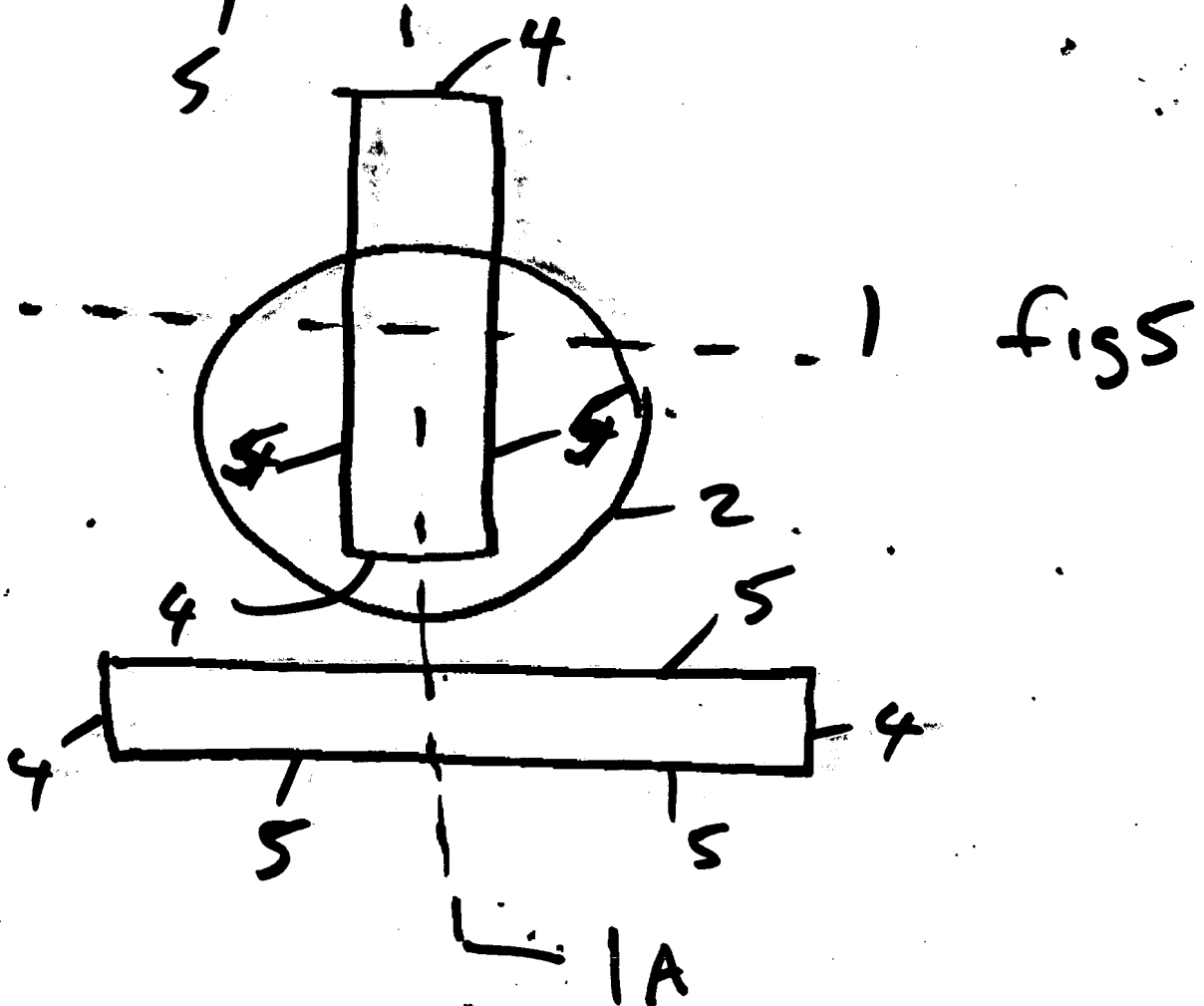
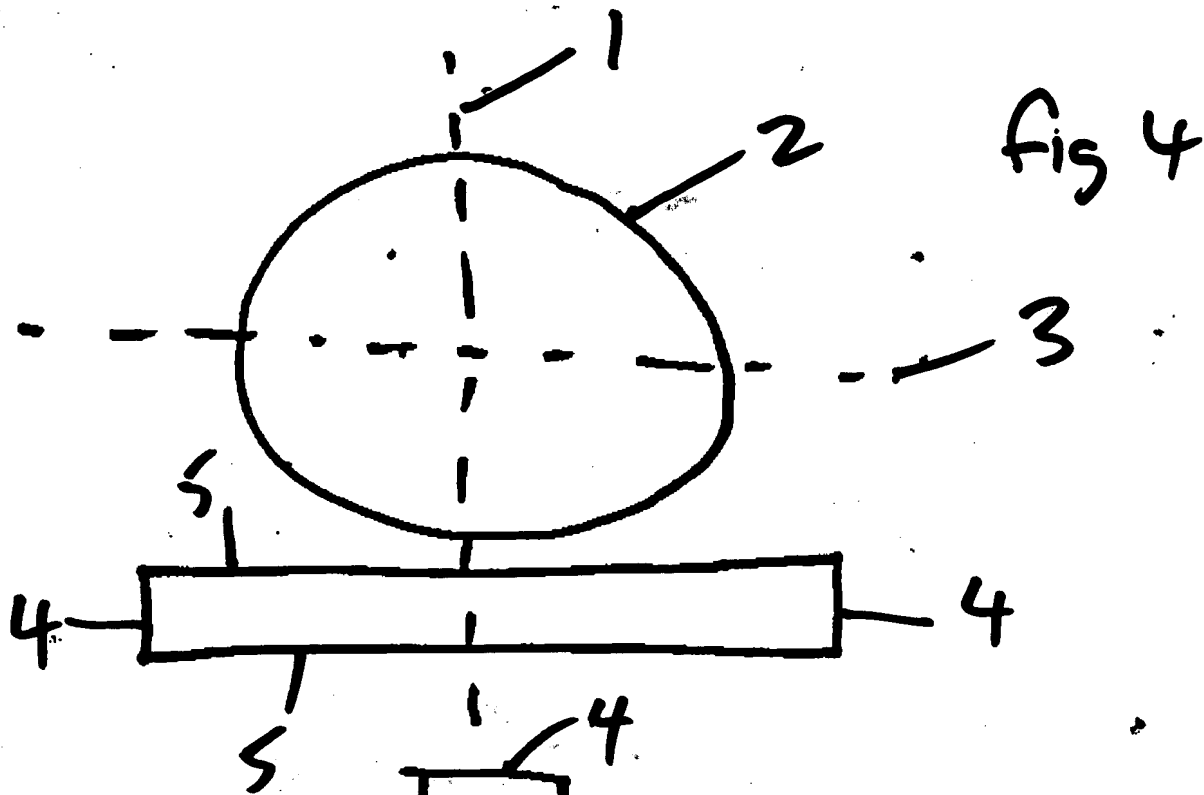
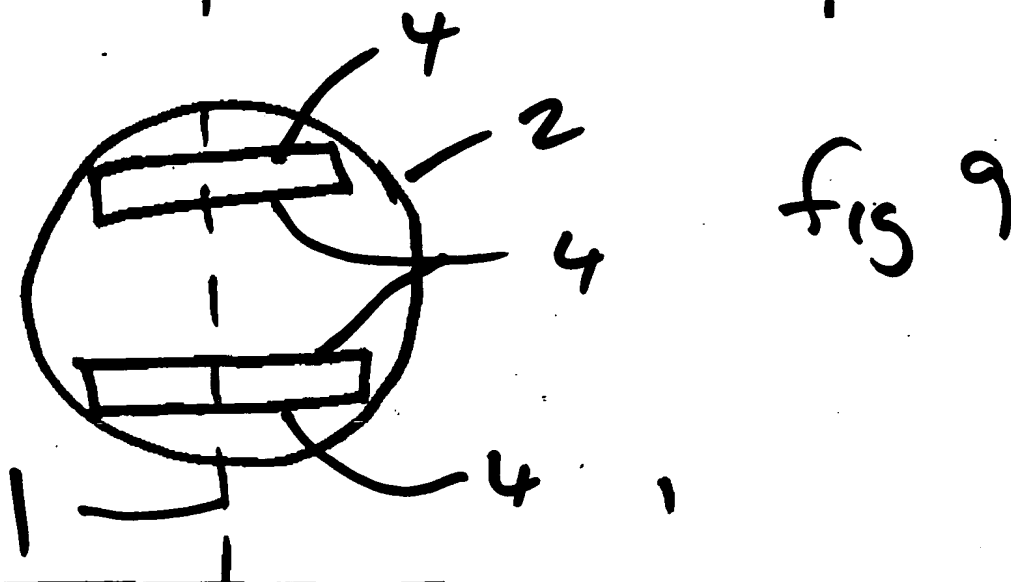
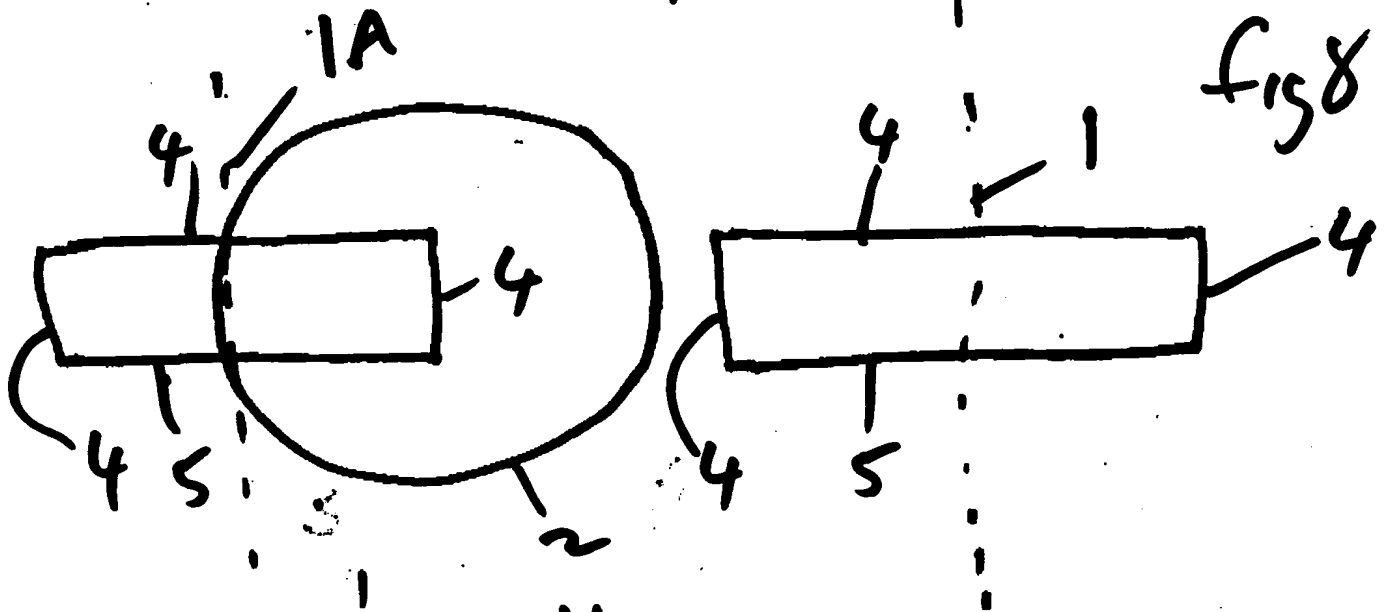
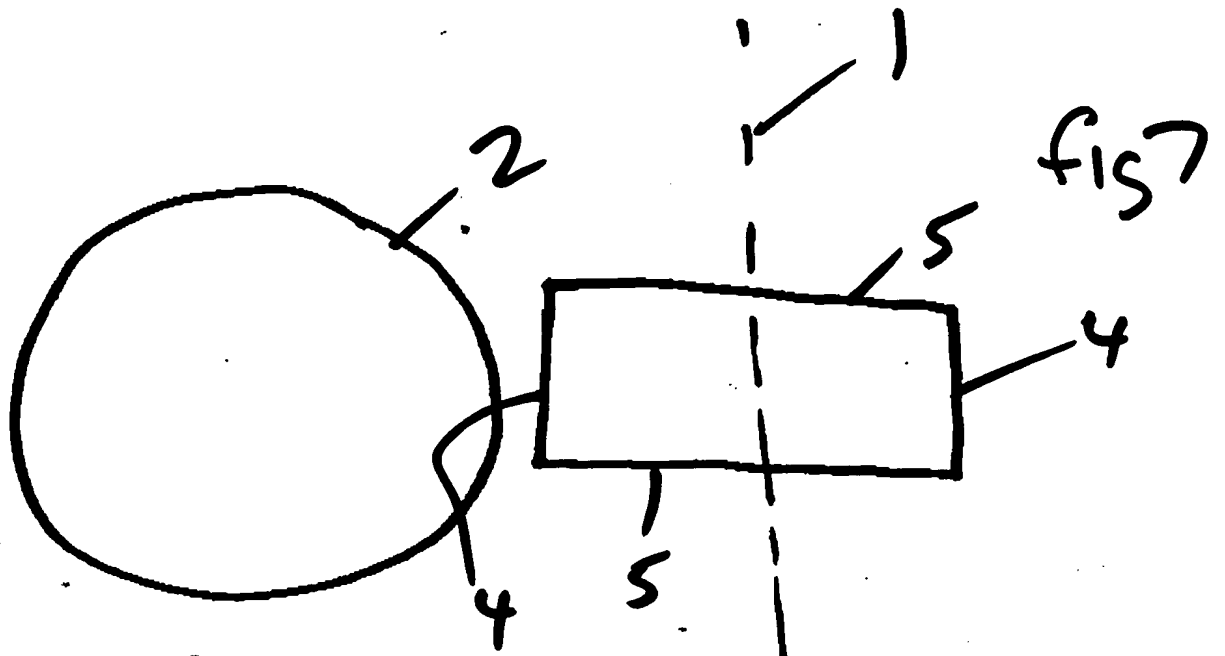


fig 3





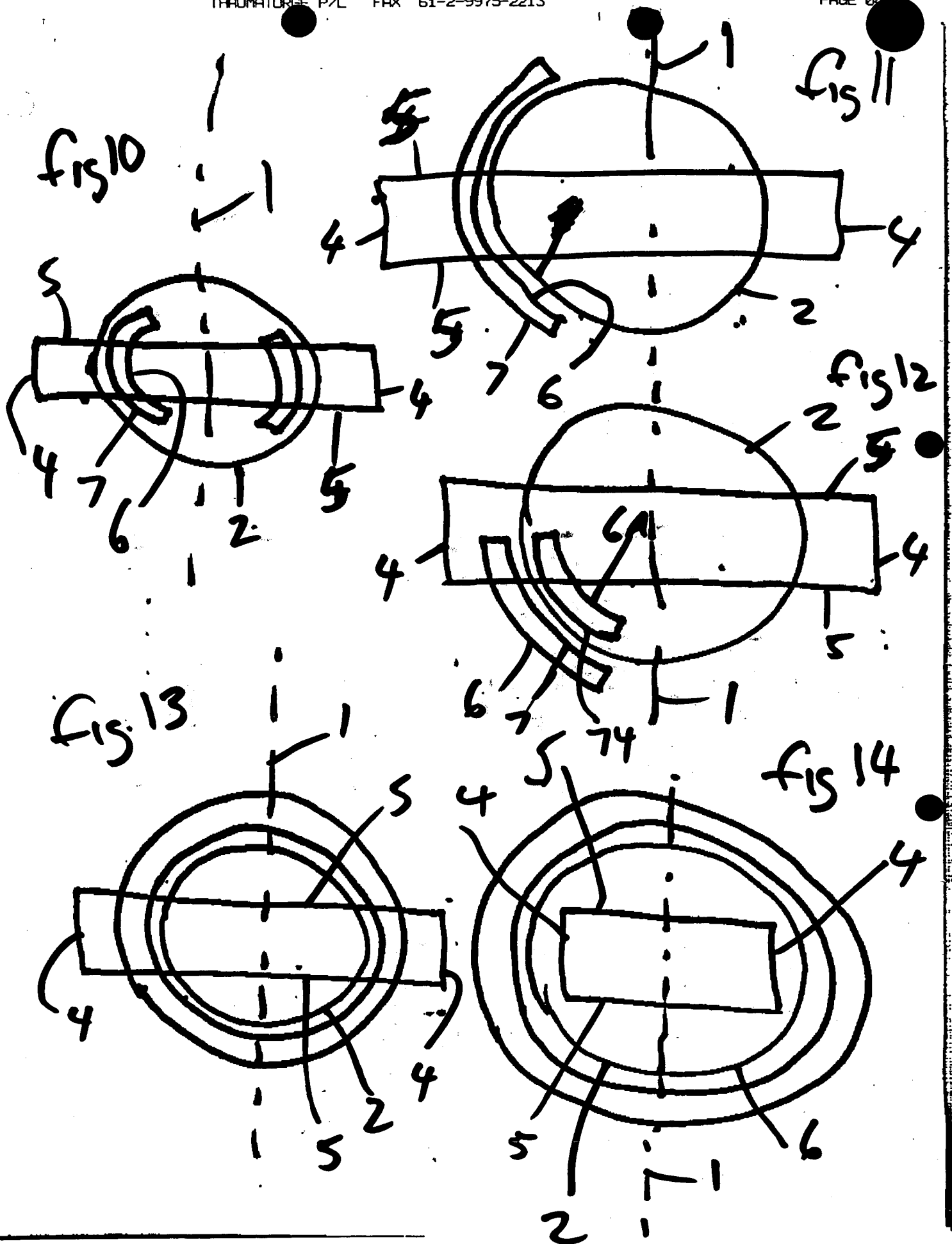


Fig 15

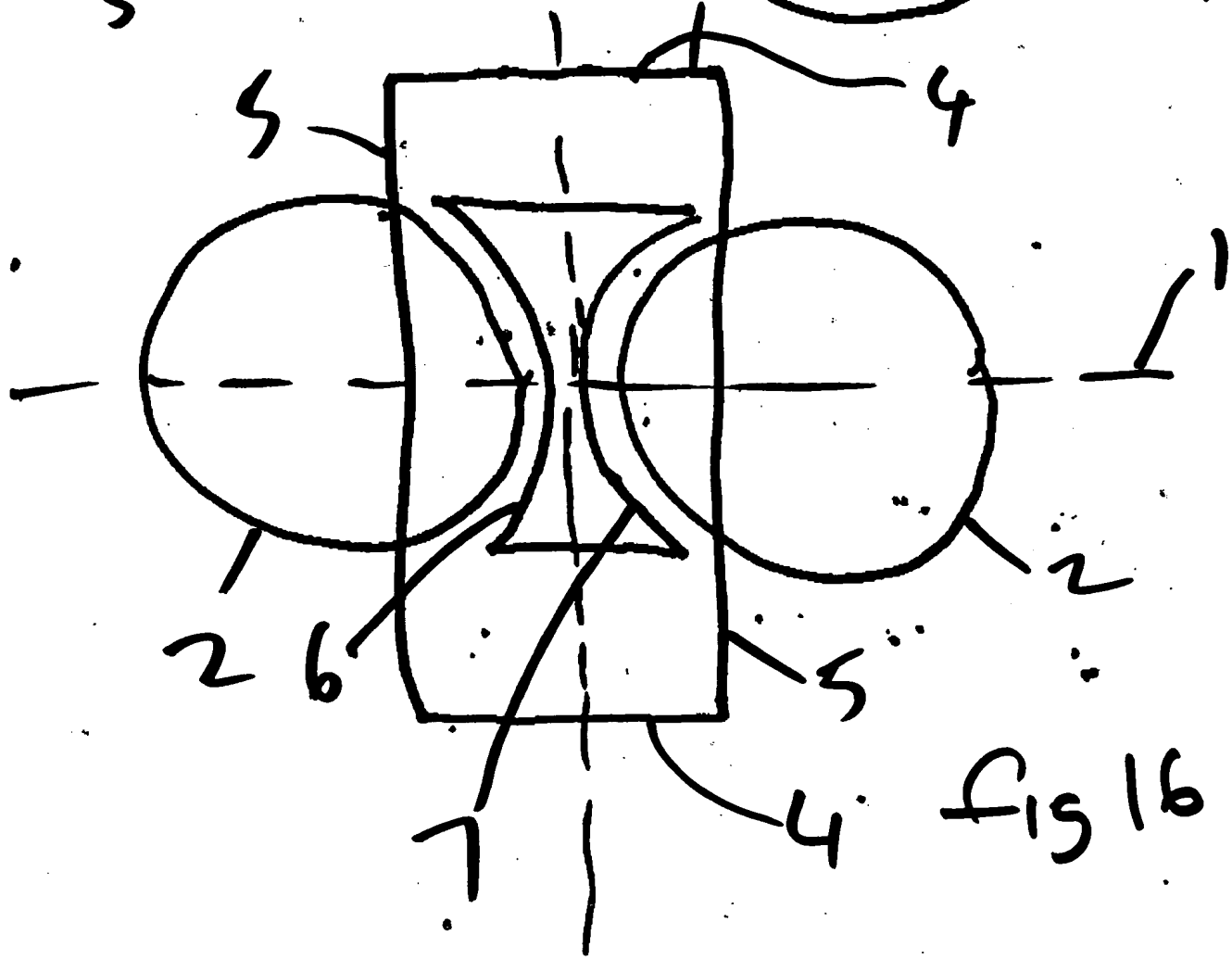
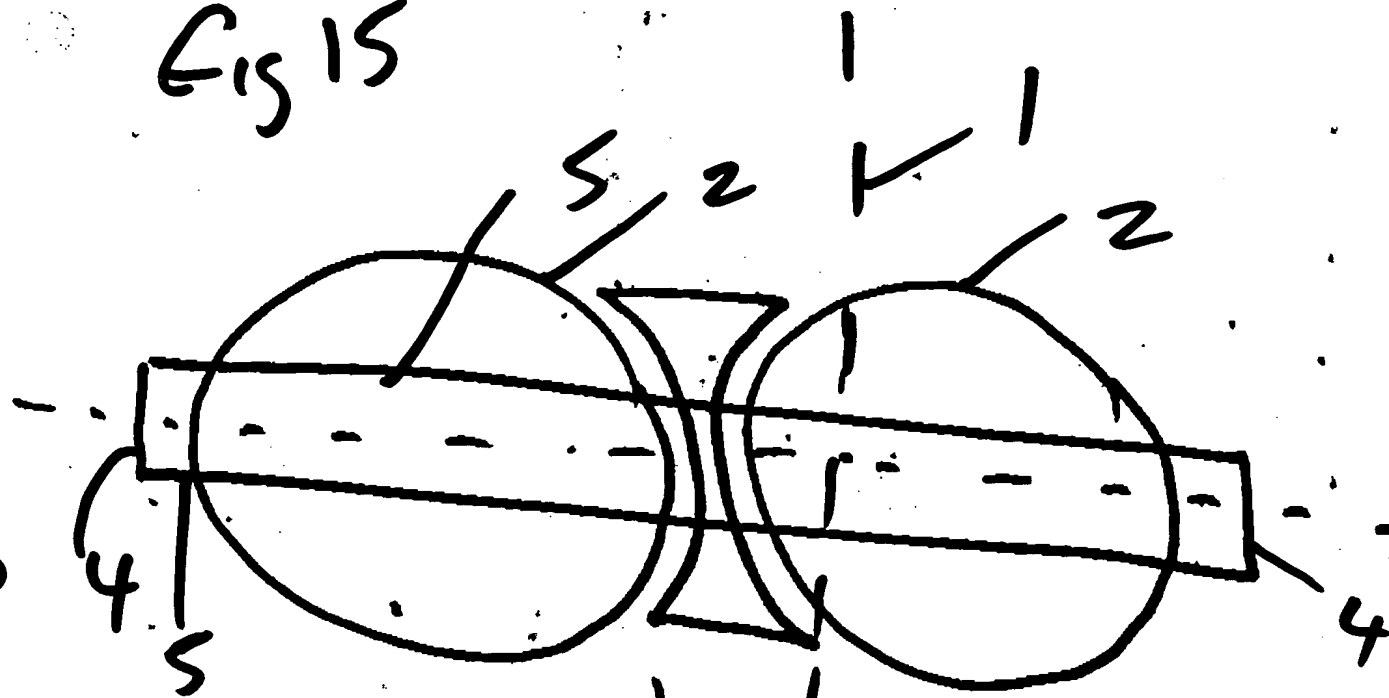


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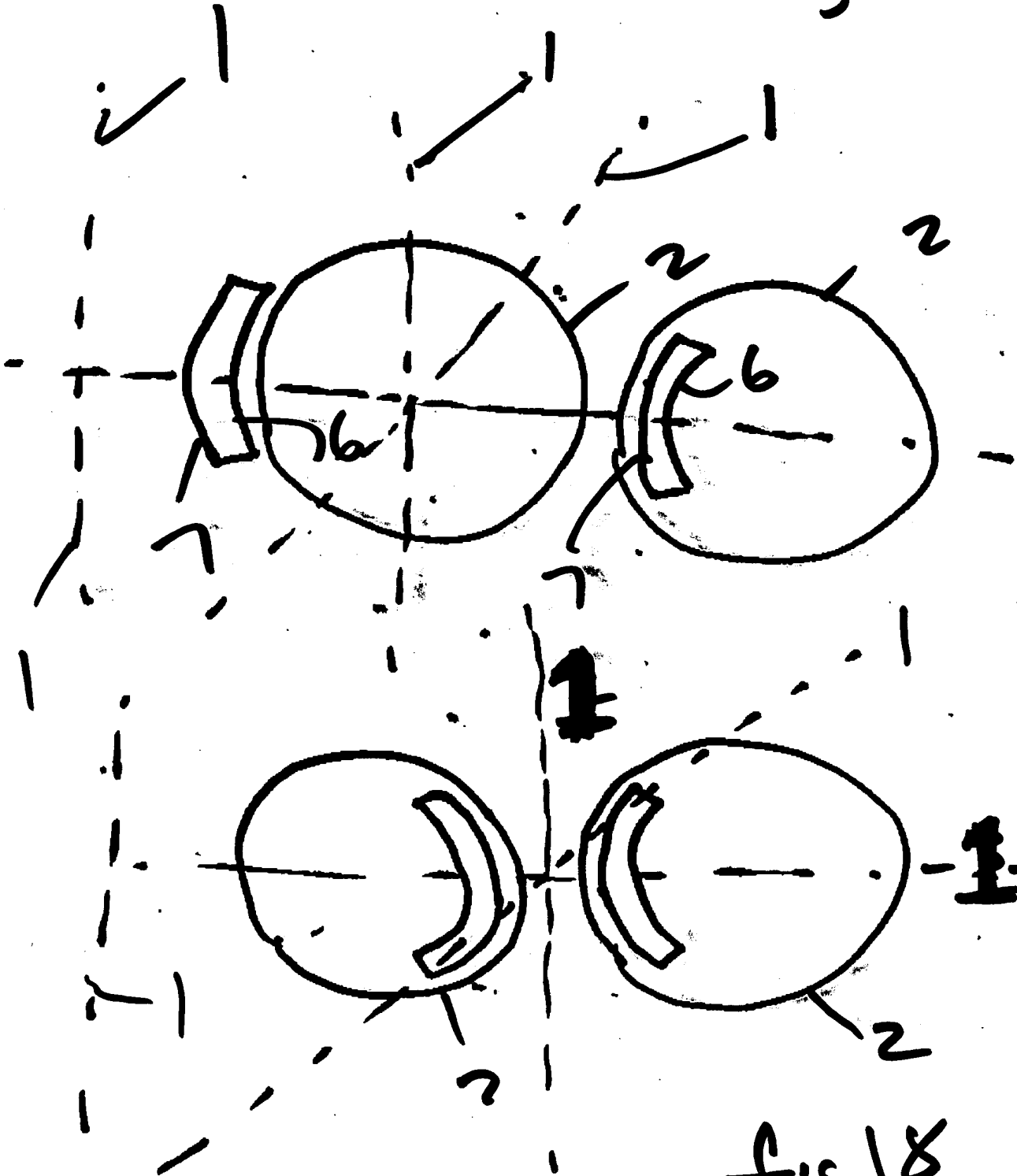


Fig 18

Fig 19

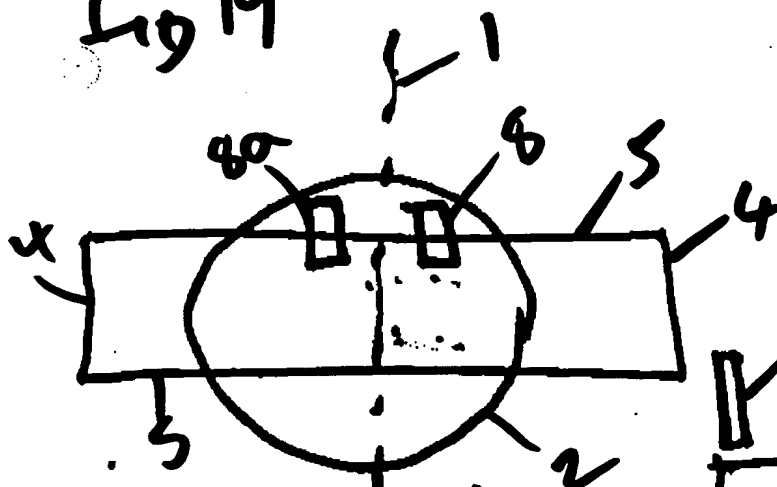


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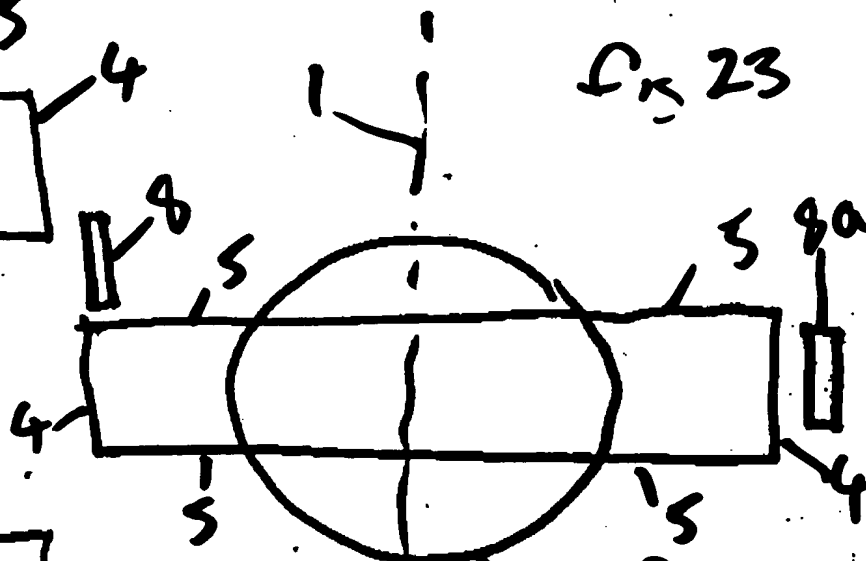


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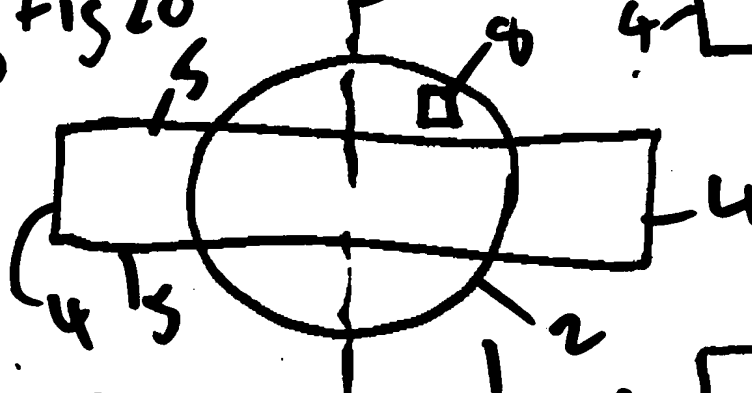


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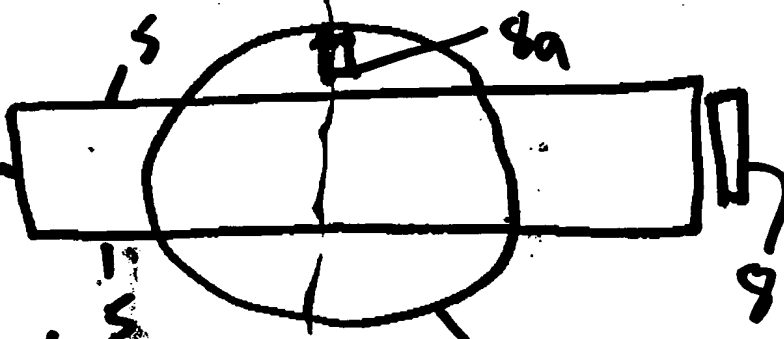


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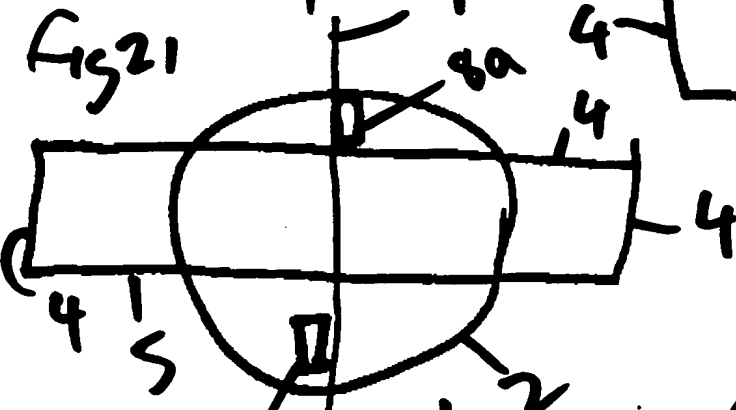


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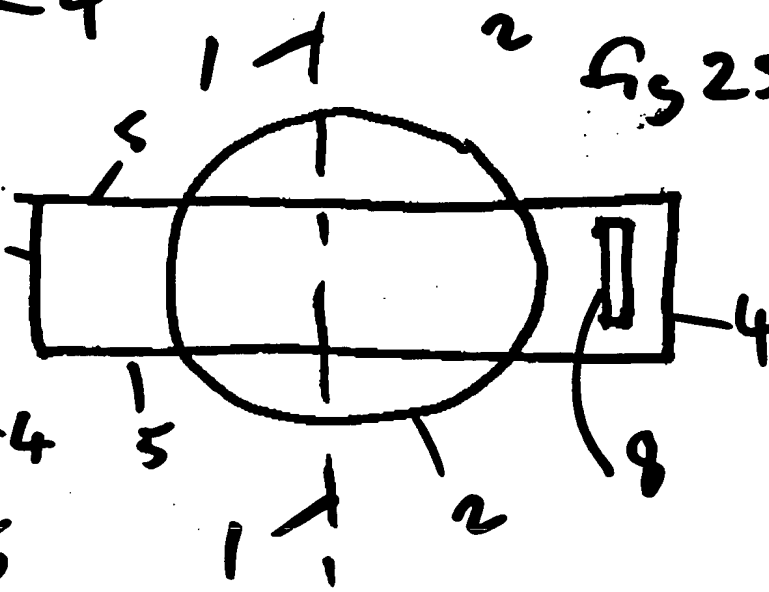
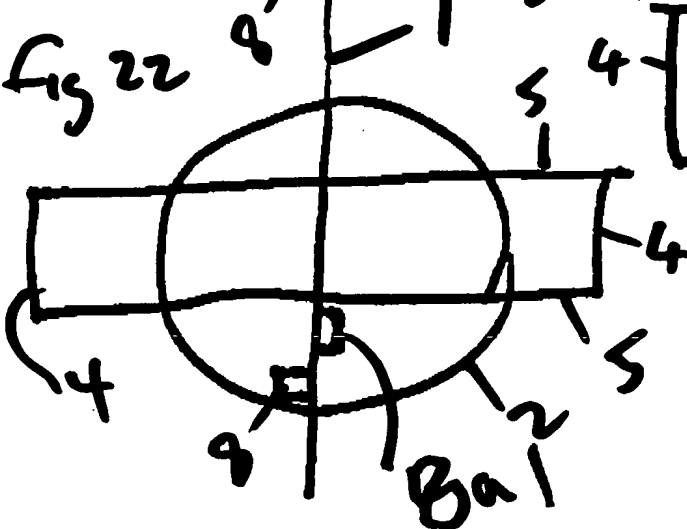


Fig 22



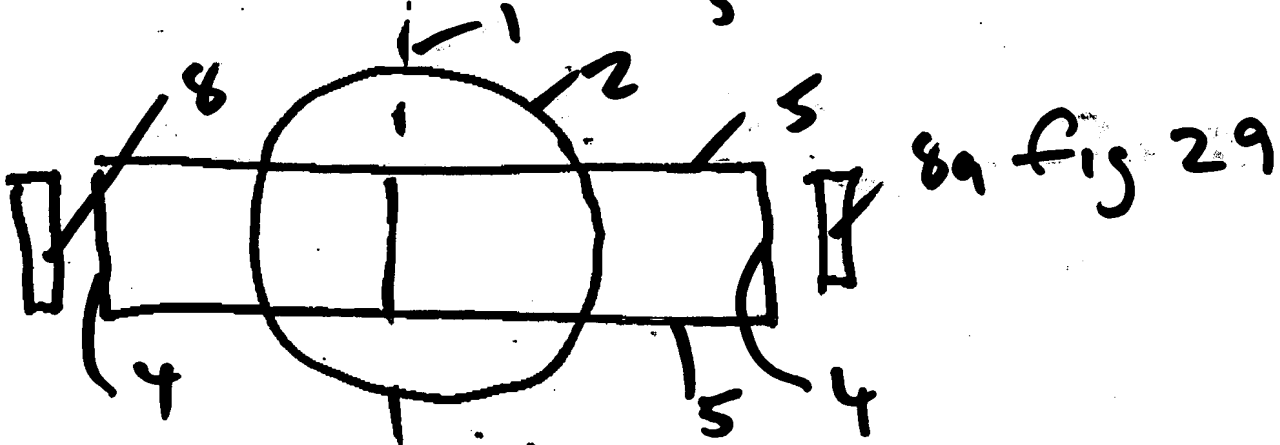
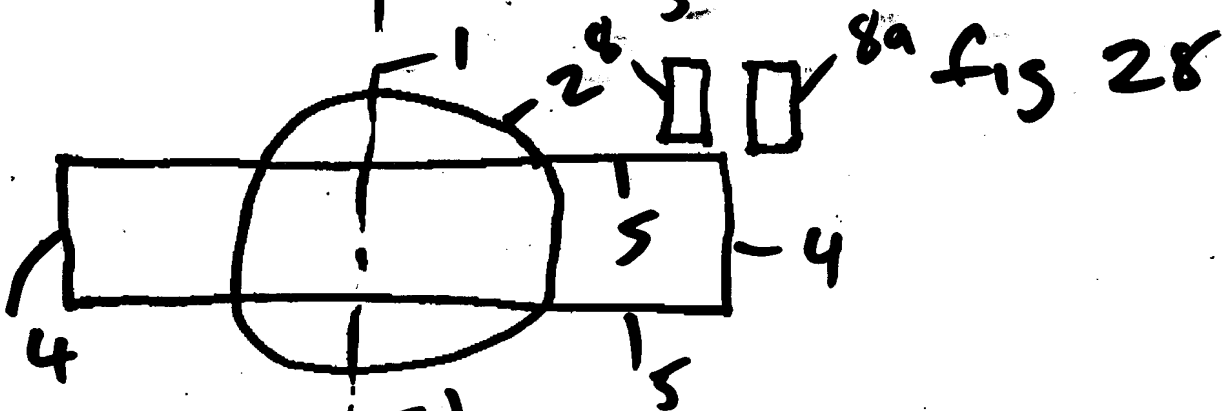
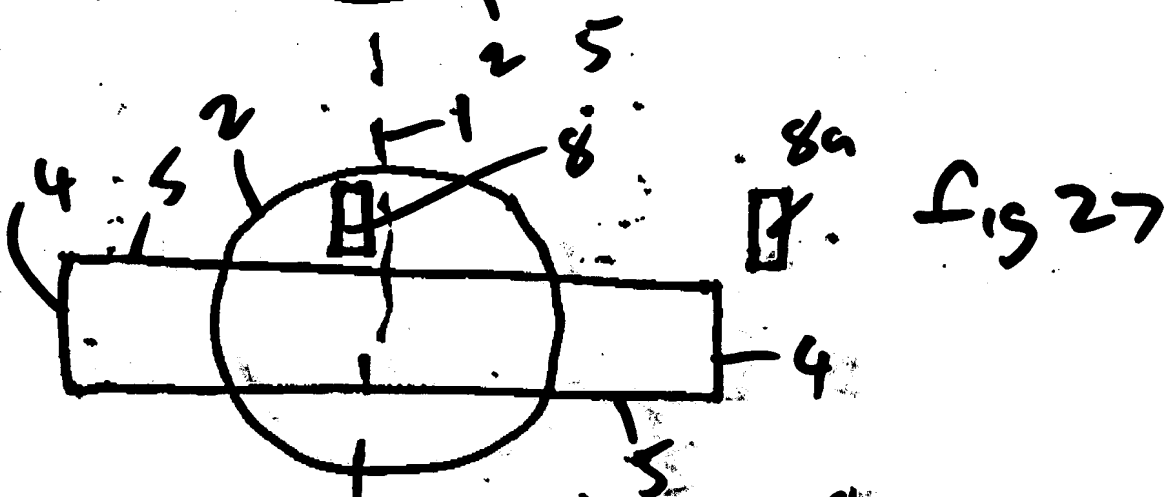
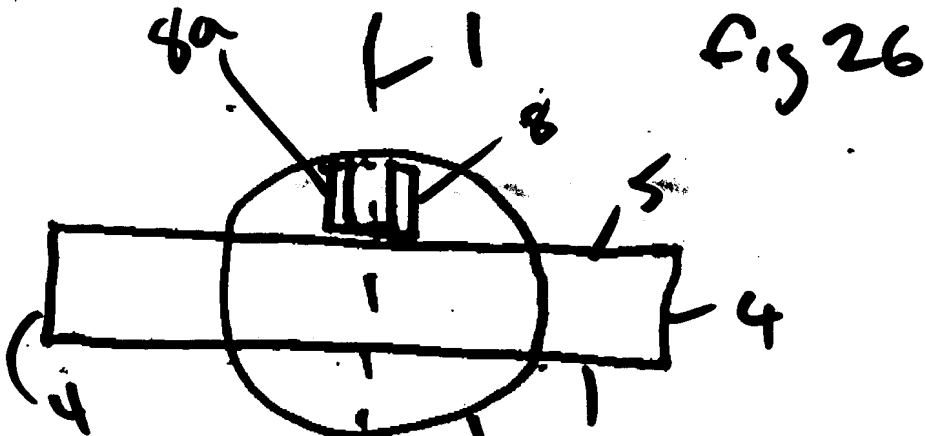


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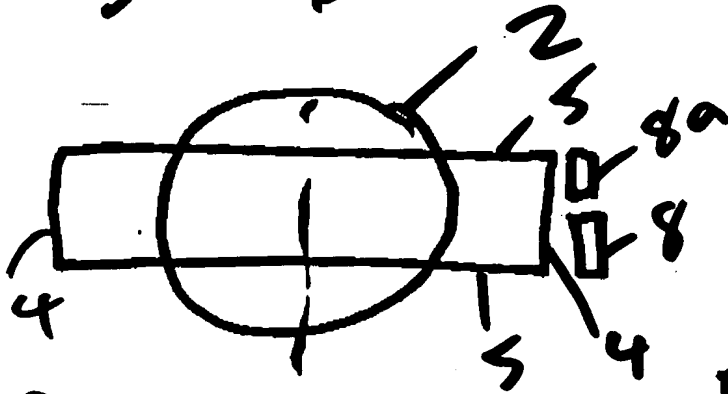


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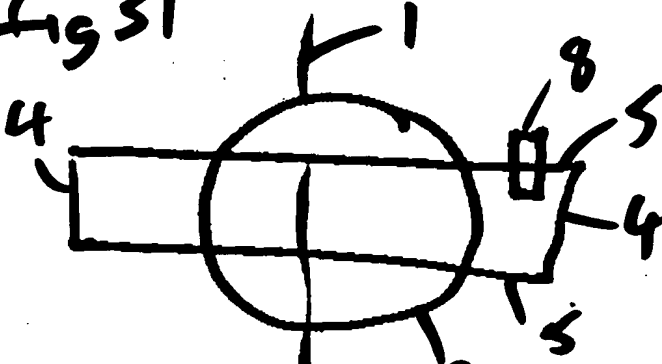


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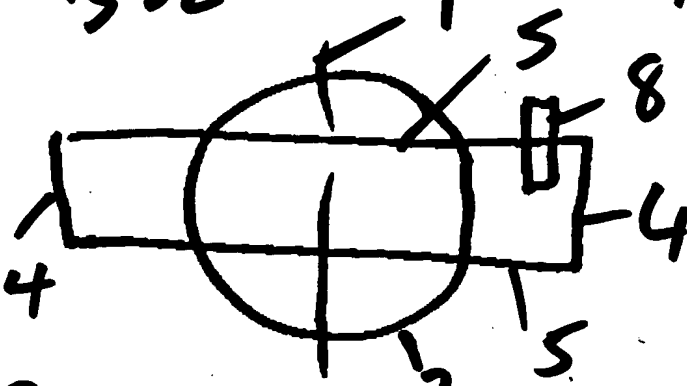


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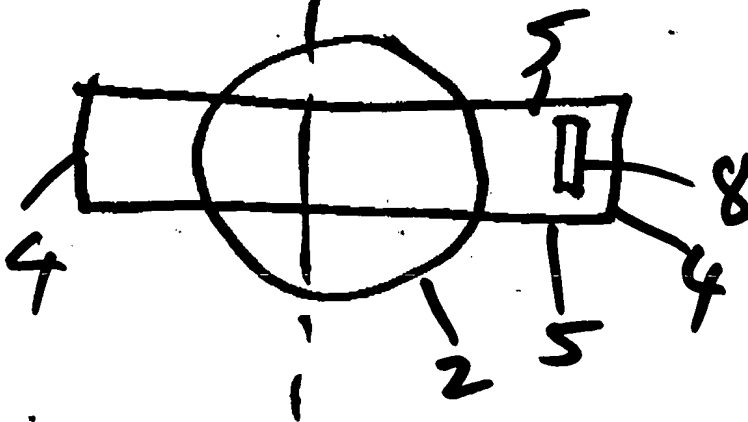


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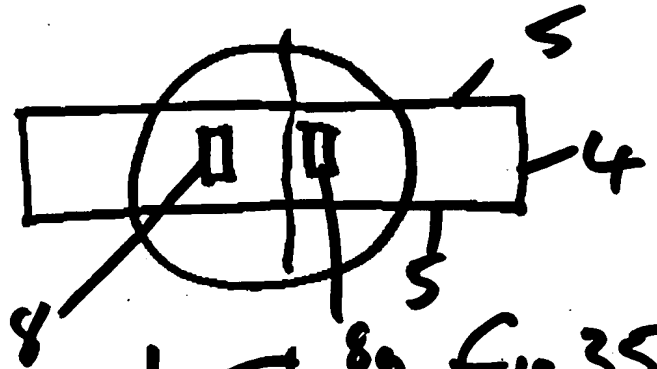


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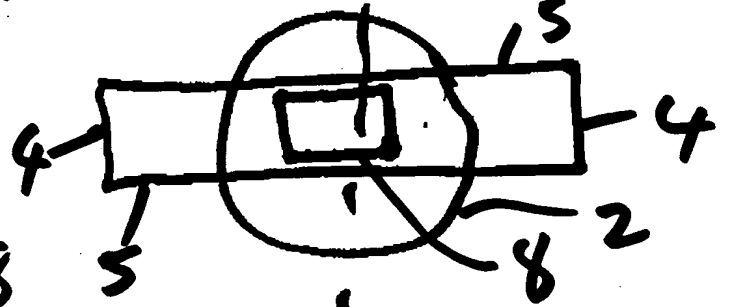
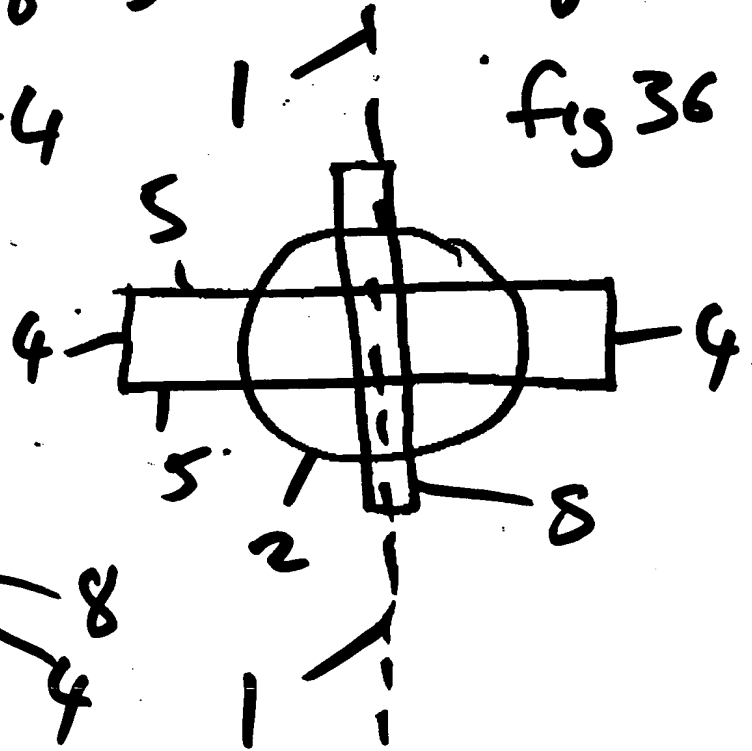


Fig 36



20:81 66'80'10

1301

Fig 37

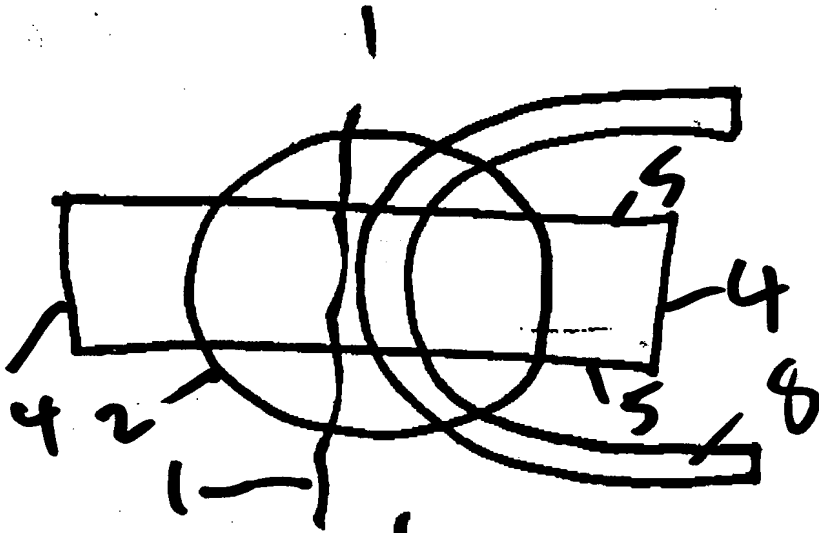


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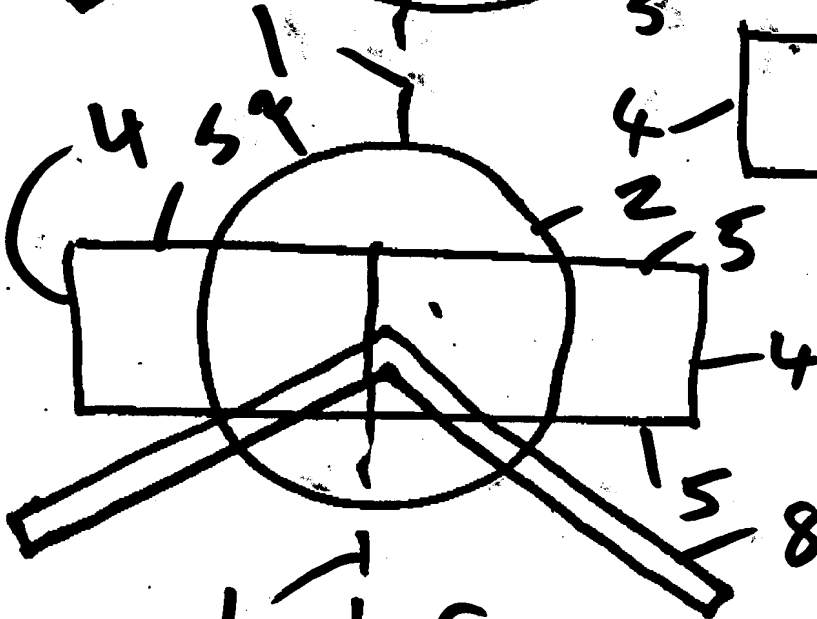
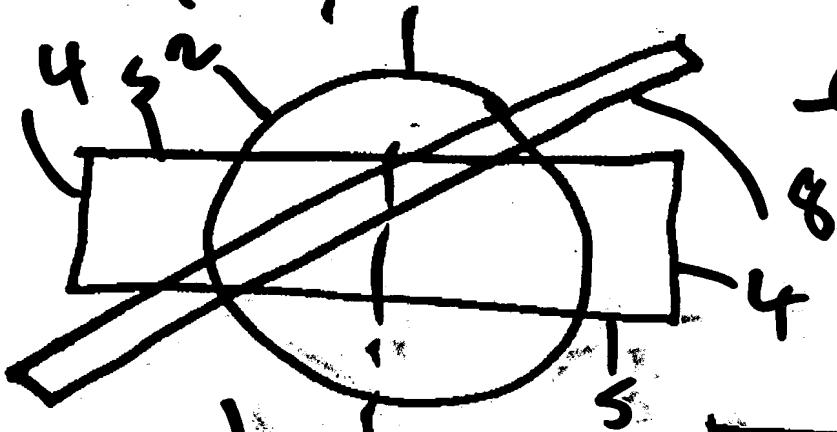
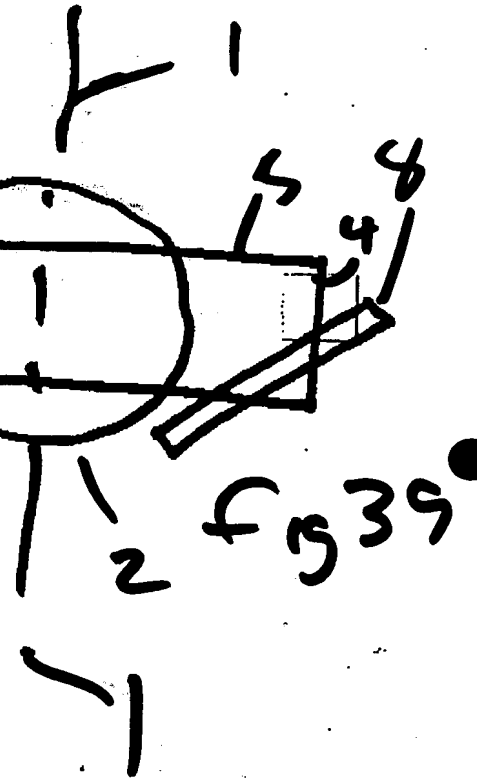


Fig 40



0:81 66'80'10

1301

Fig 41

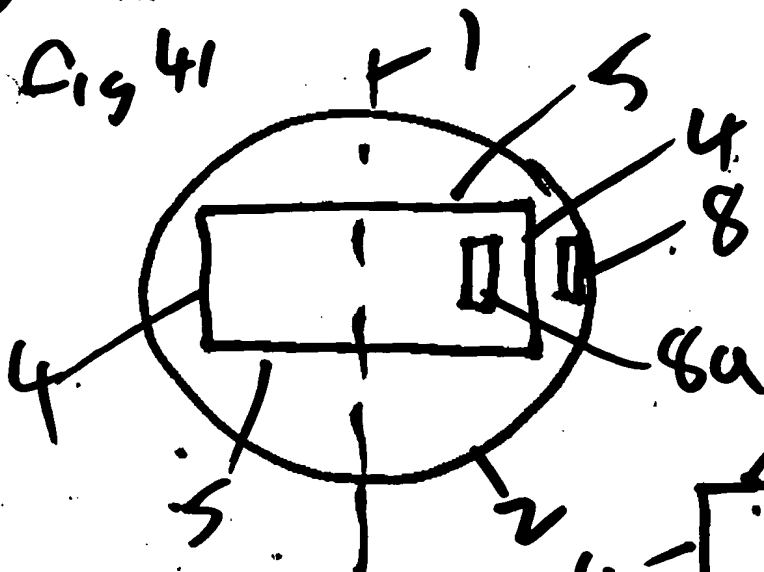


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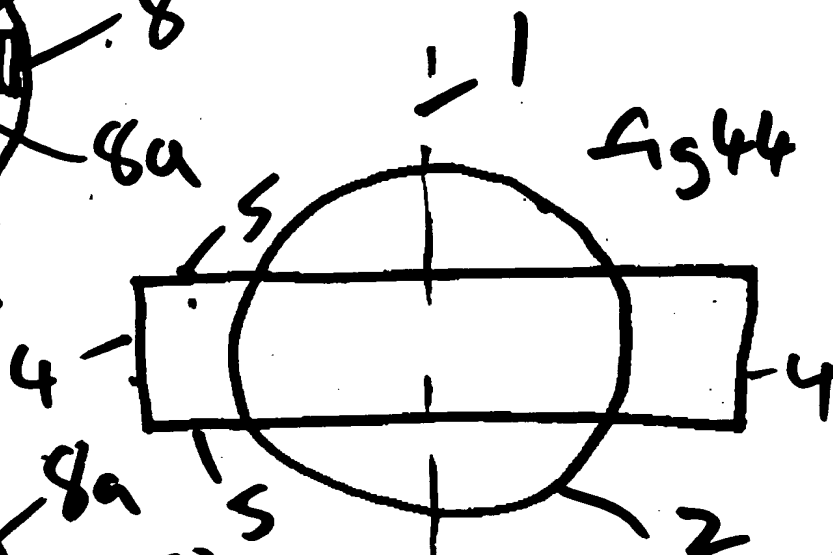


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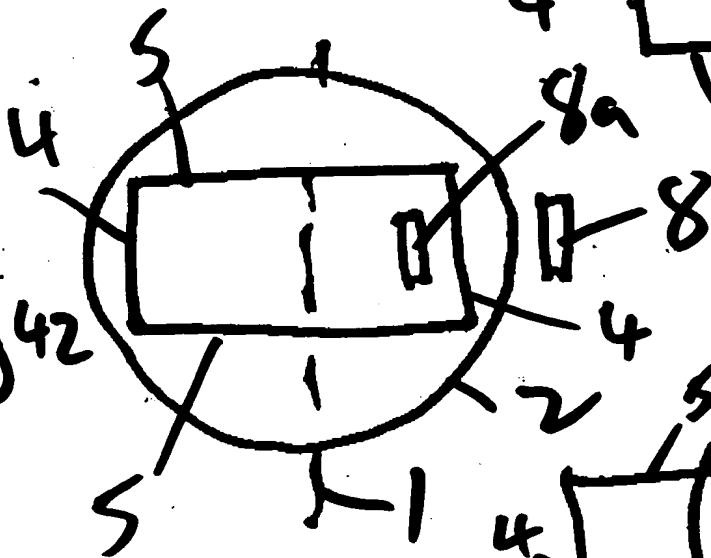


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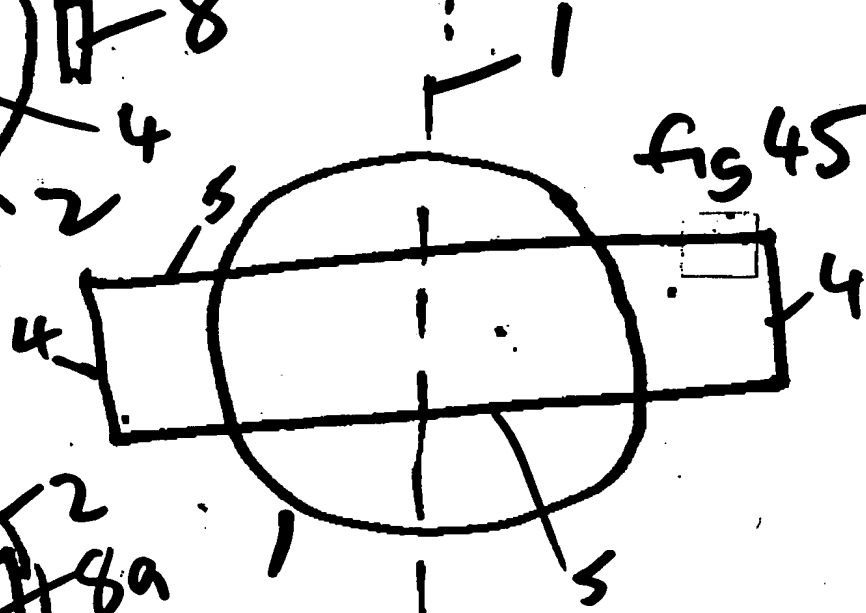


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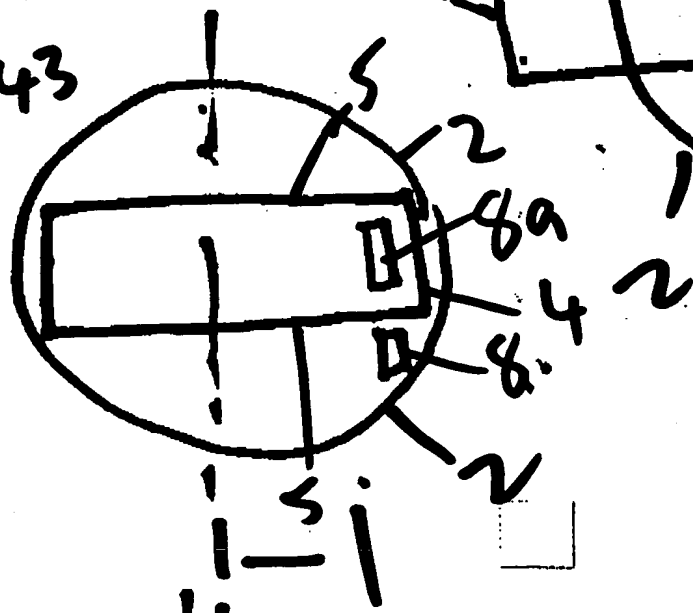


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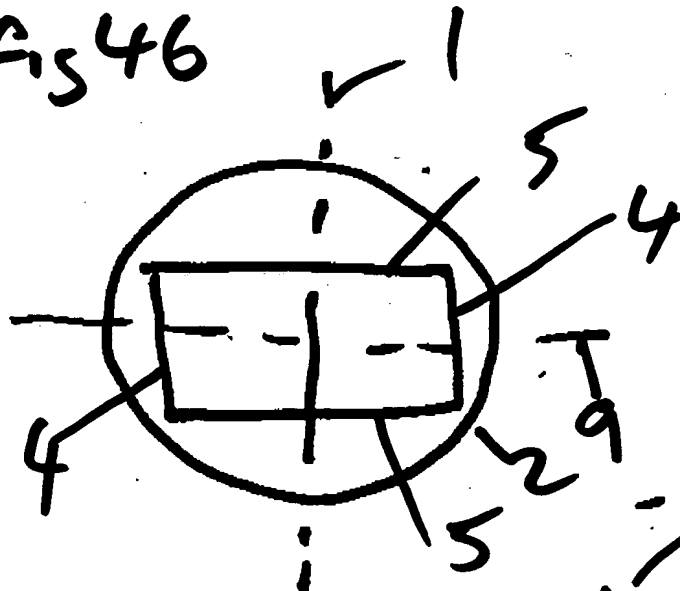


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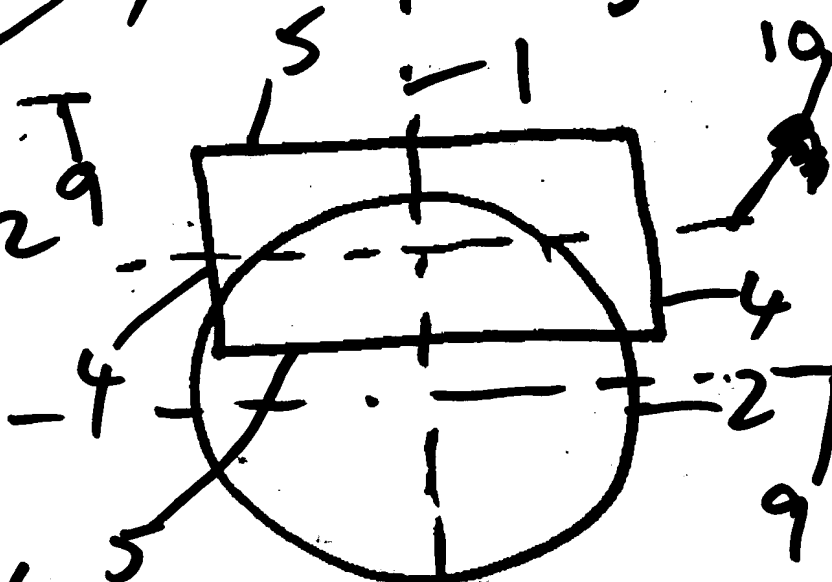


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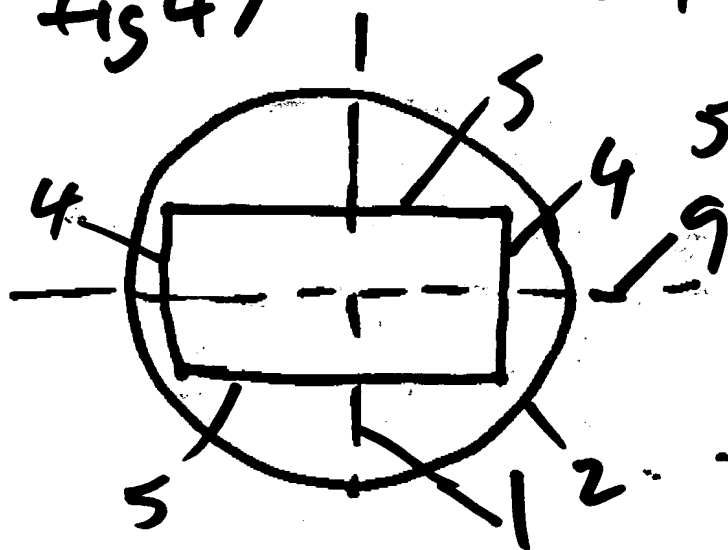


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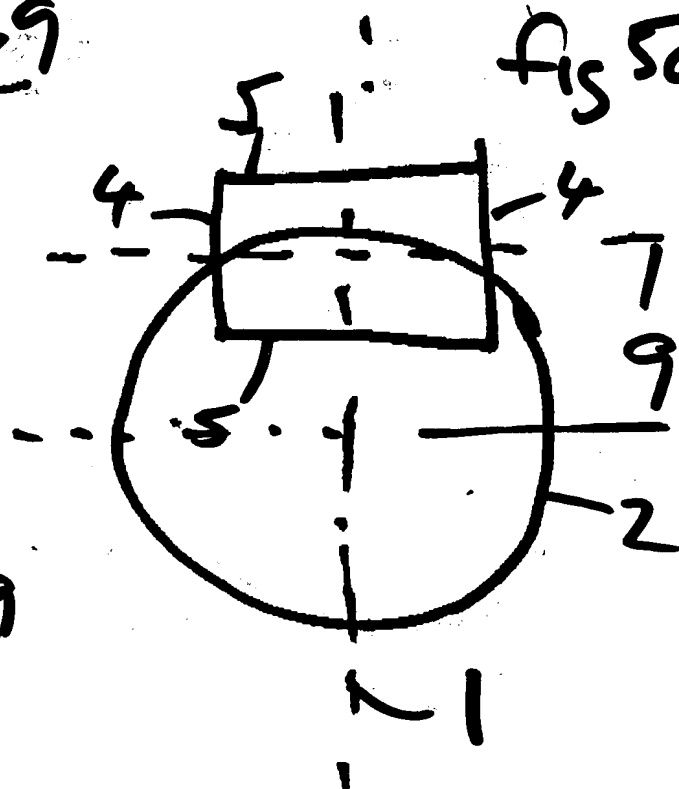
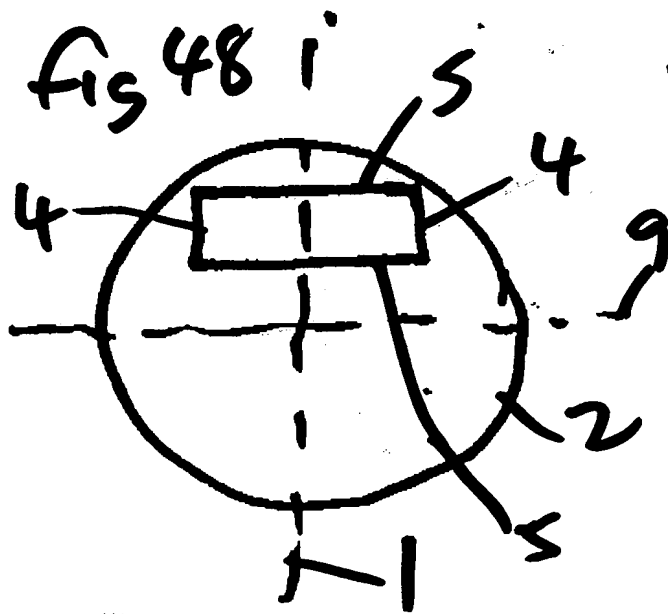


fig 48 i



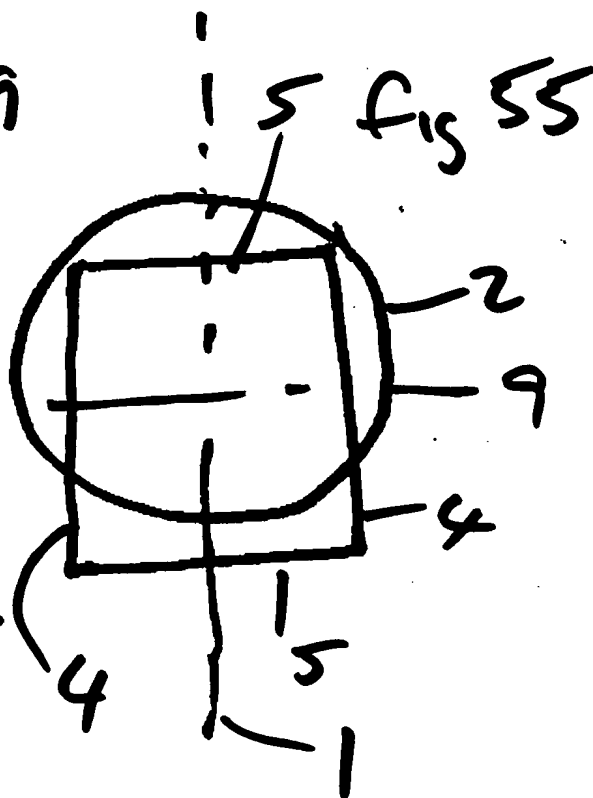
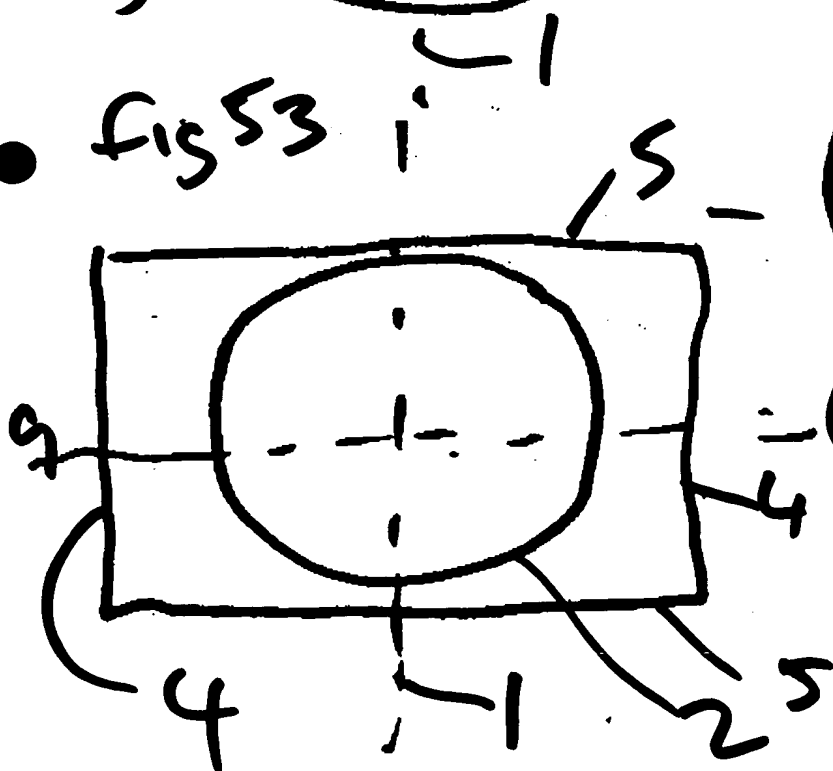
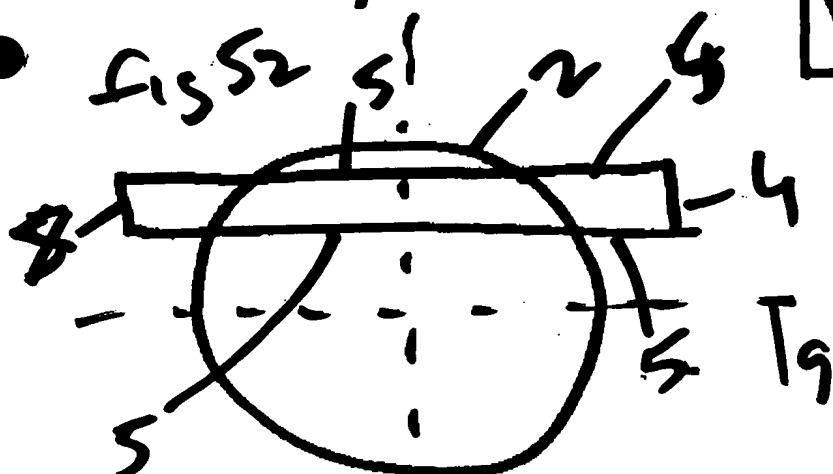
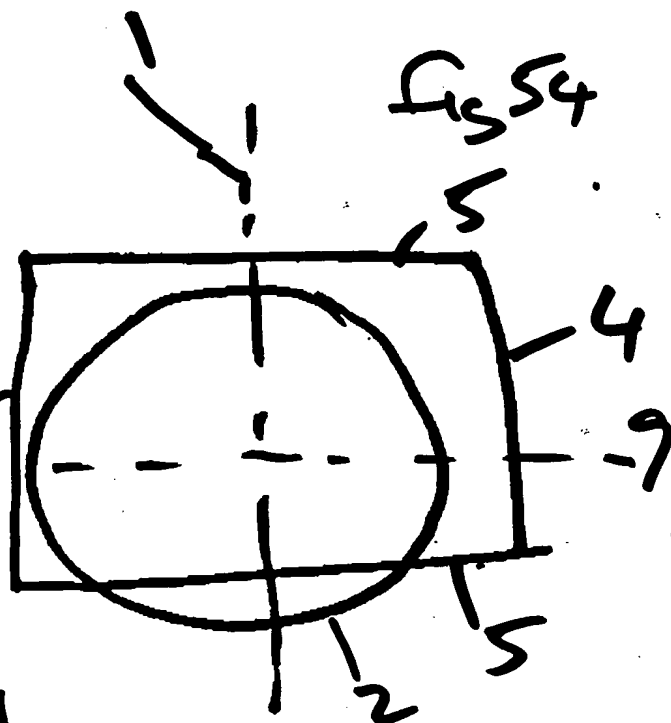
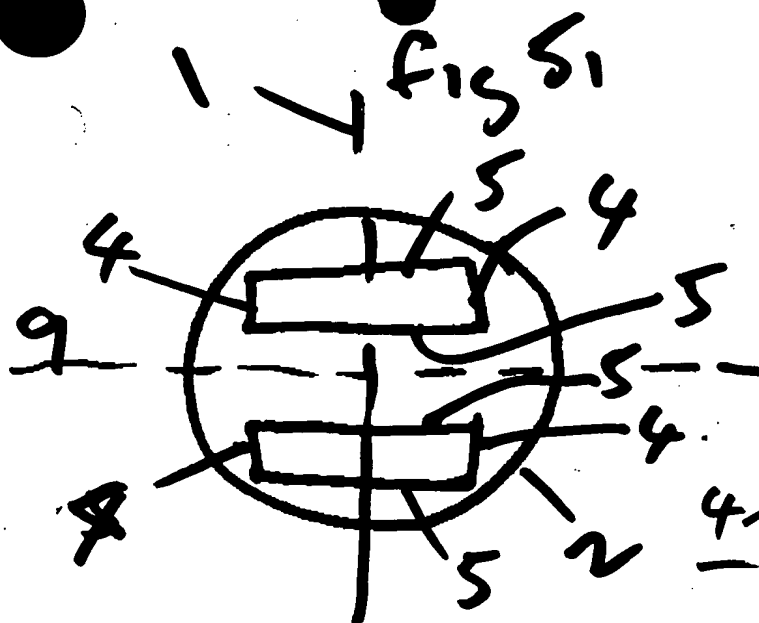


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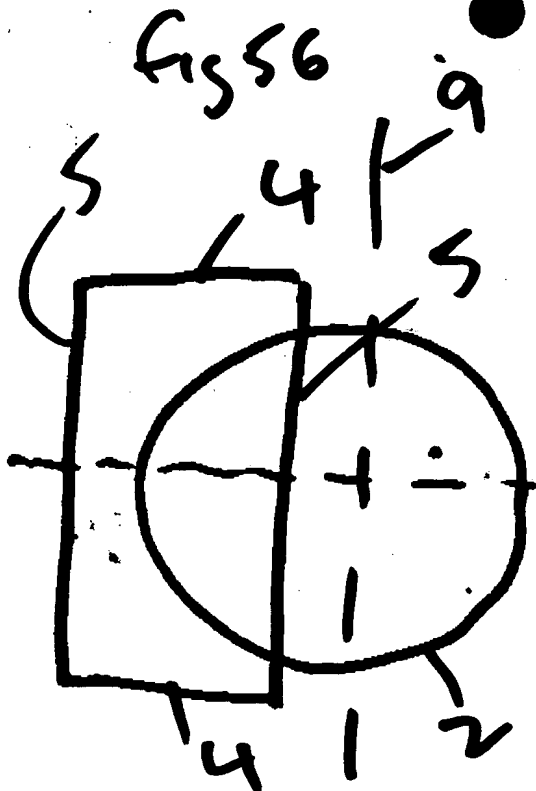


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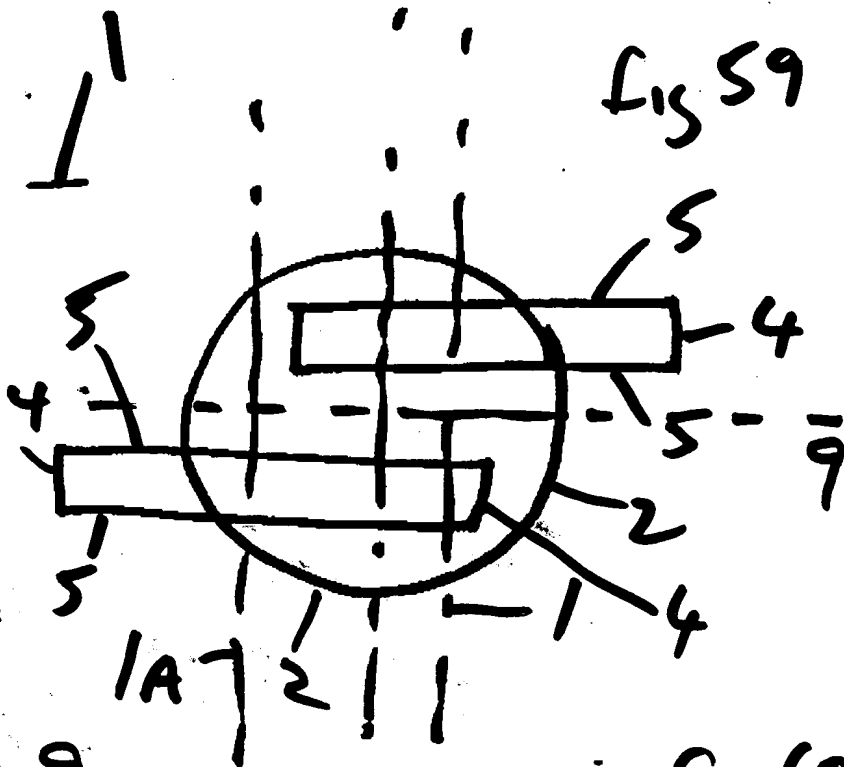


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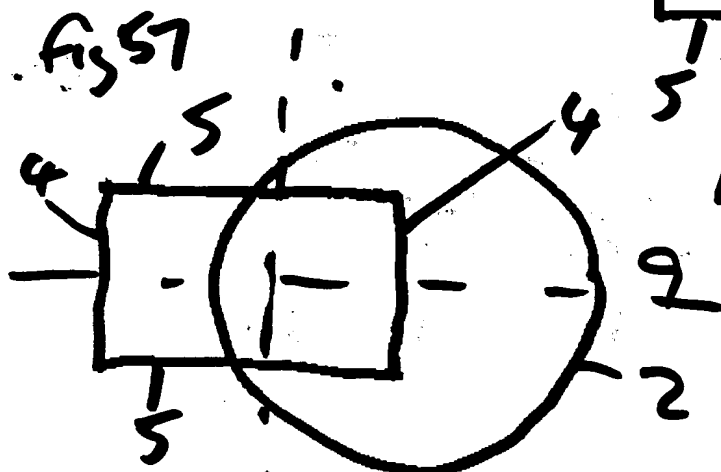


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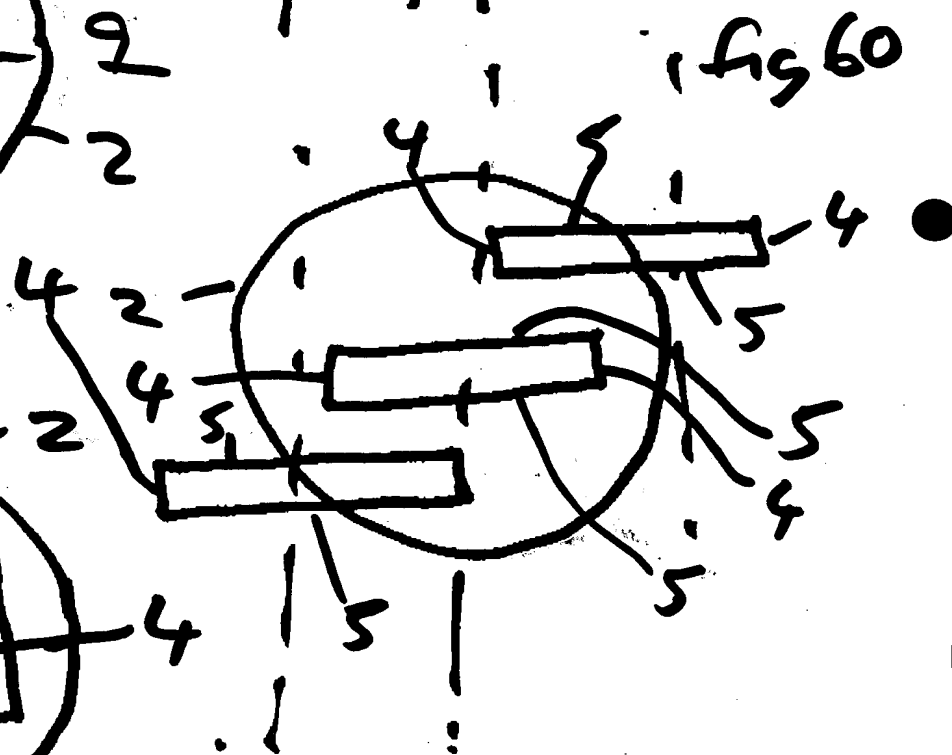


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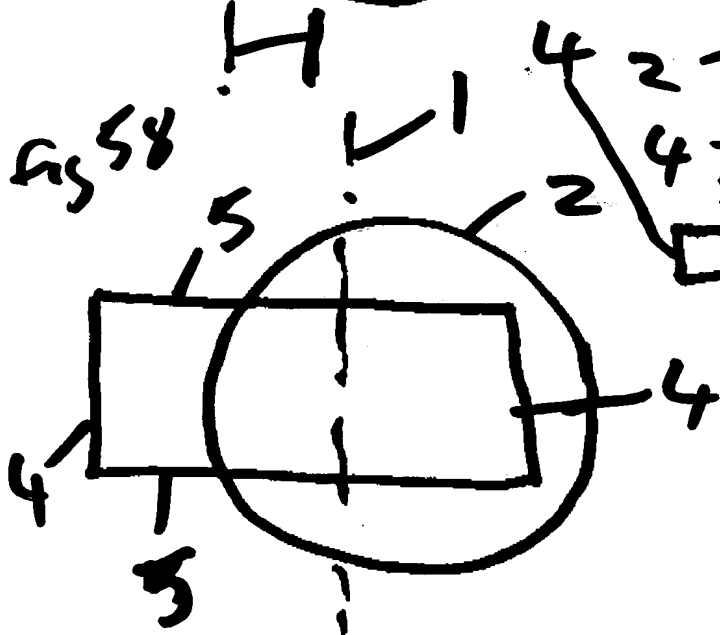


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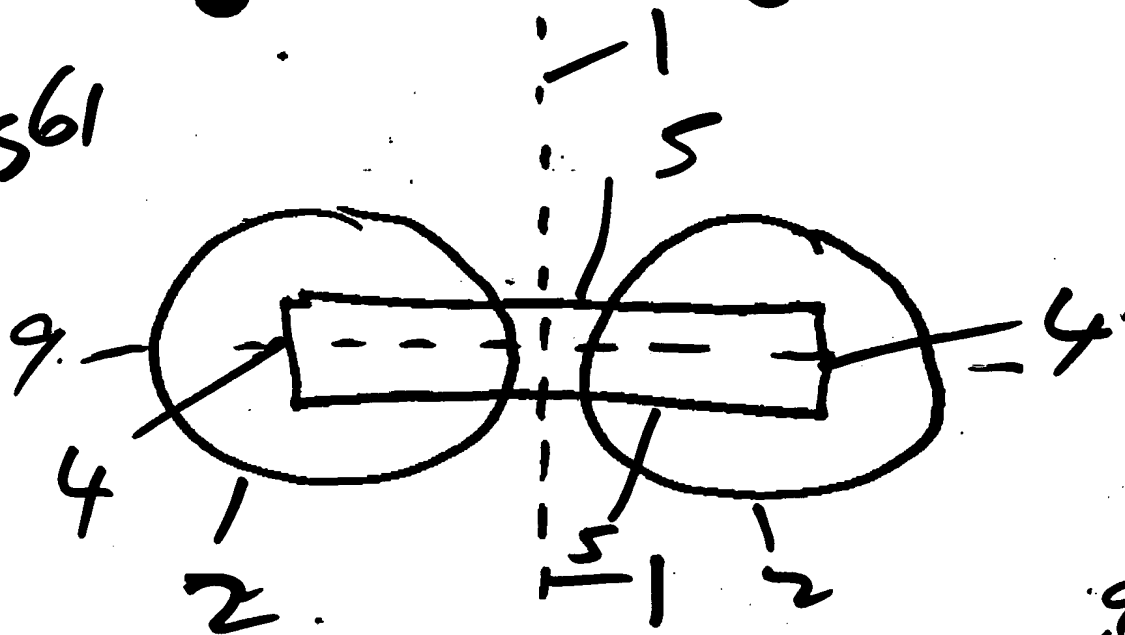


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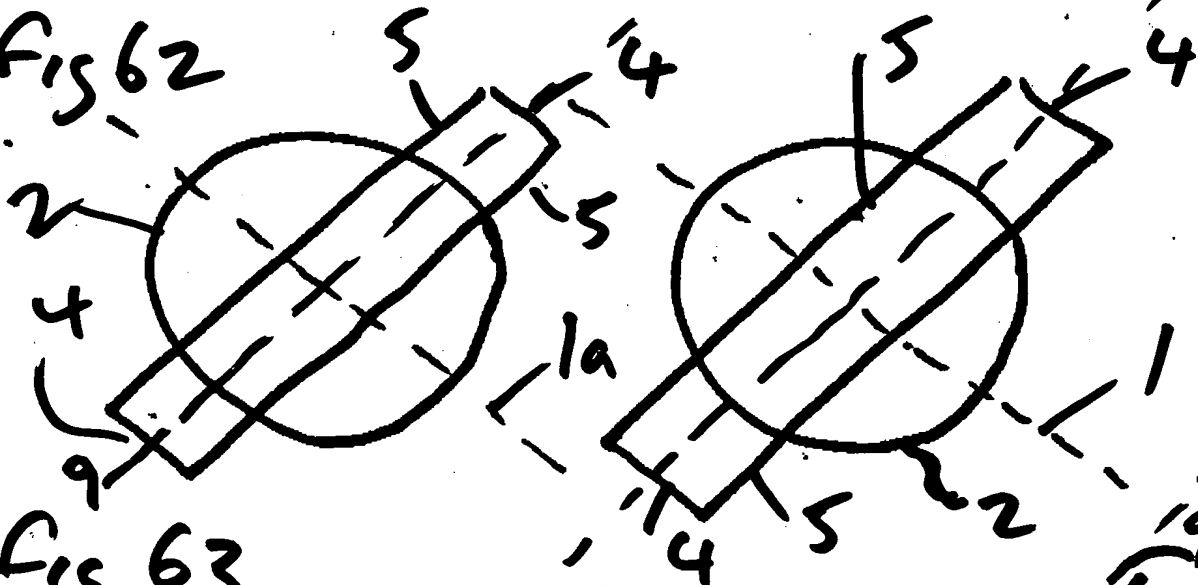


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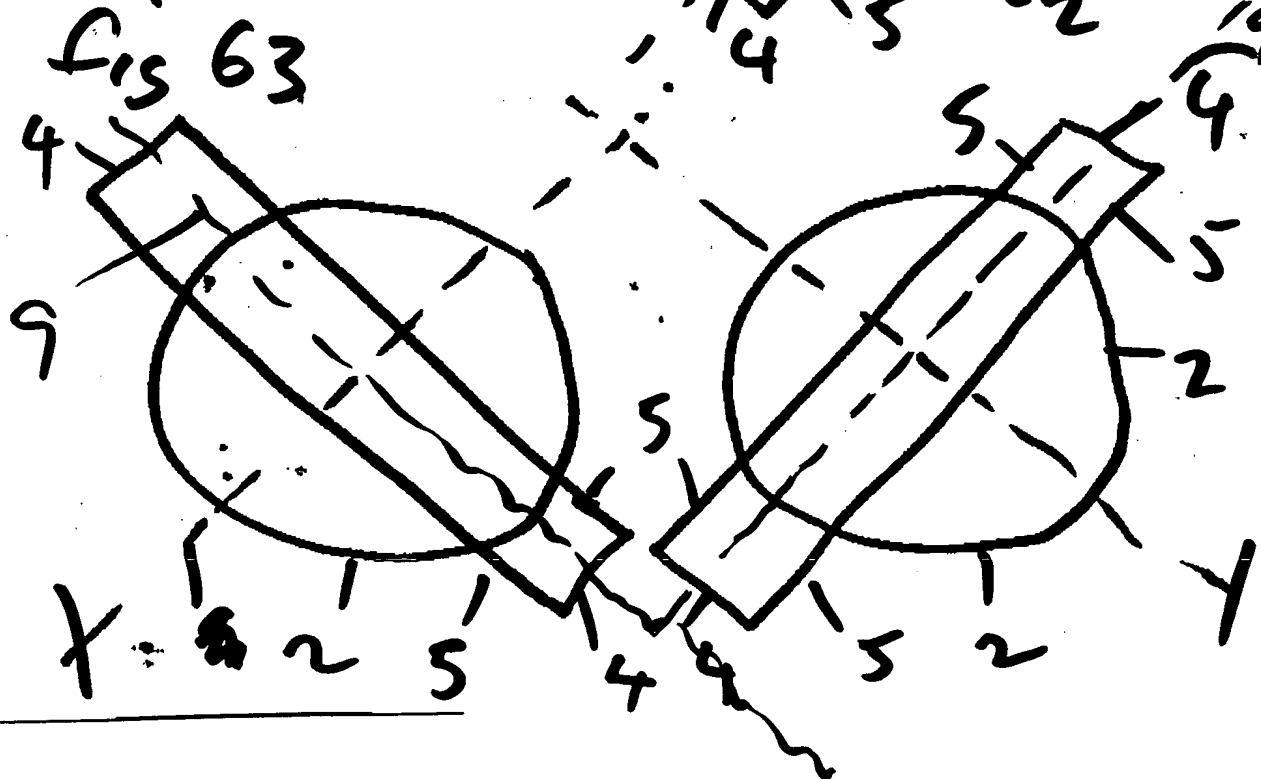


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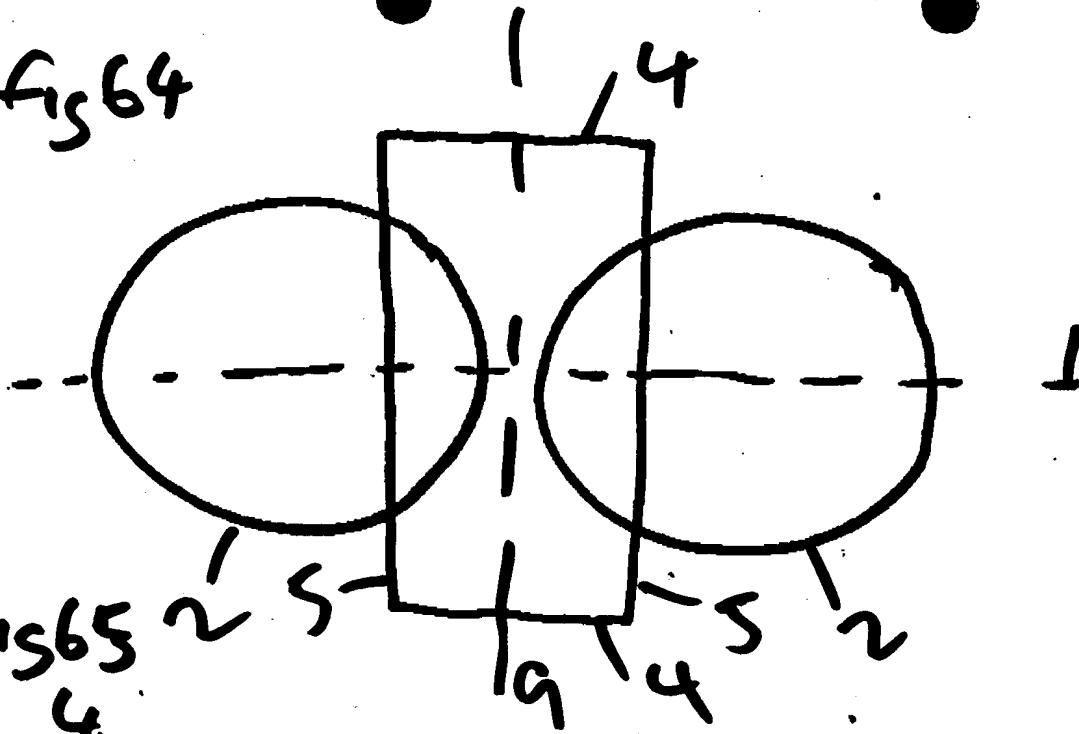


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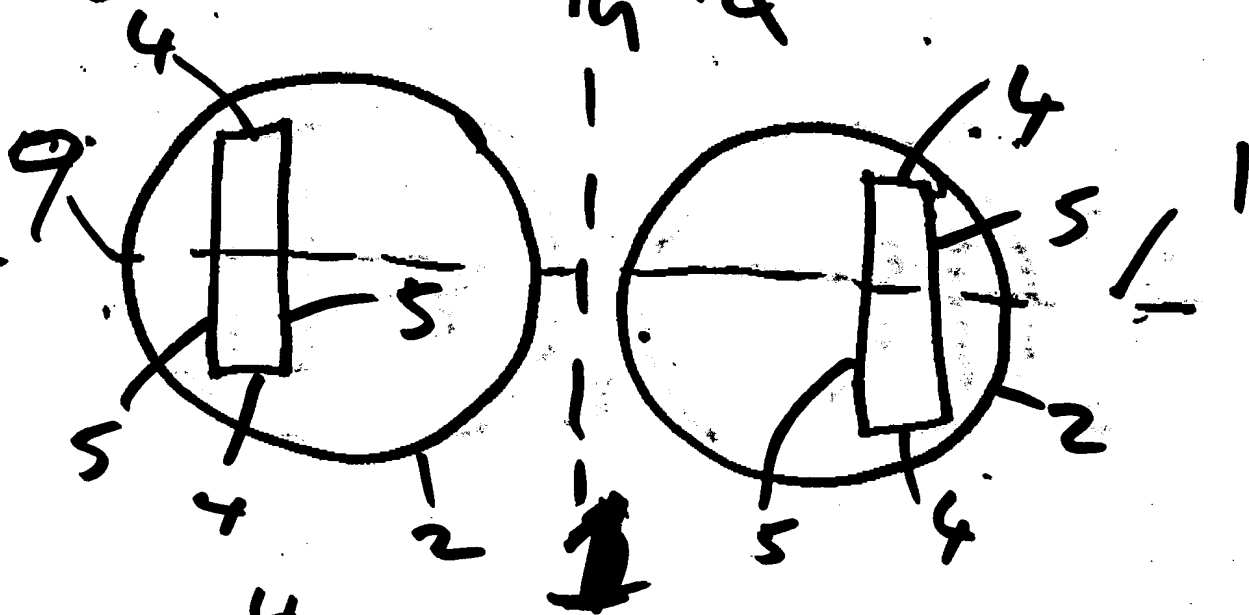


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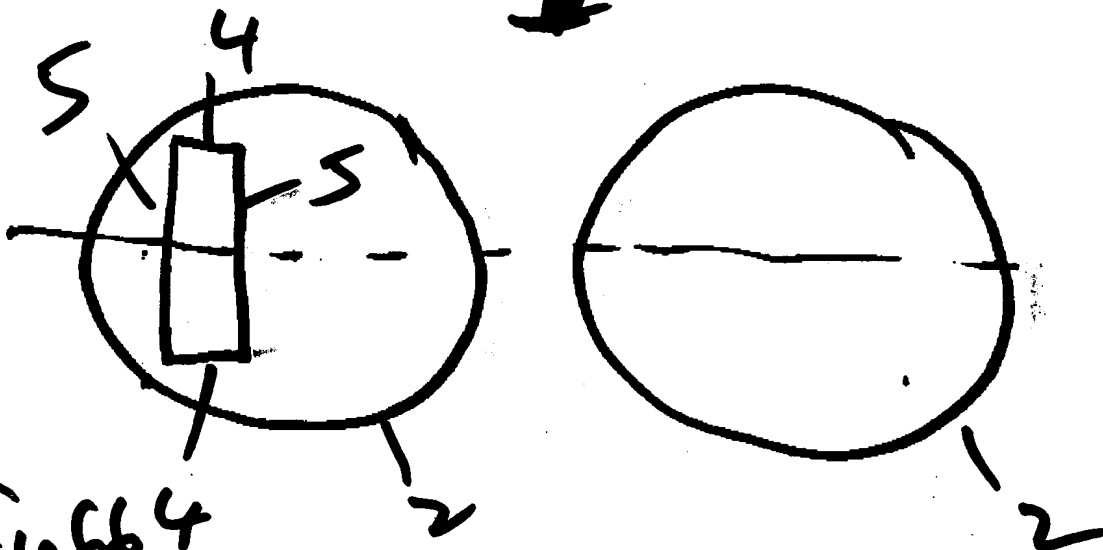


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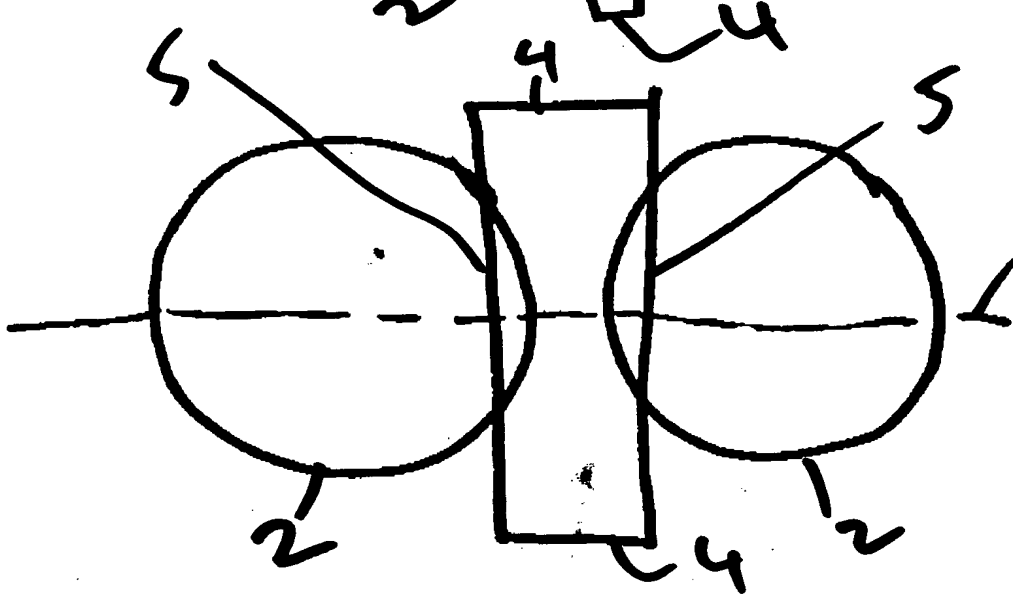
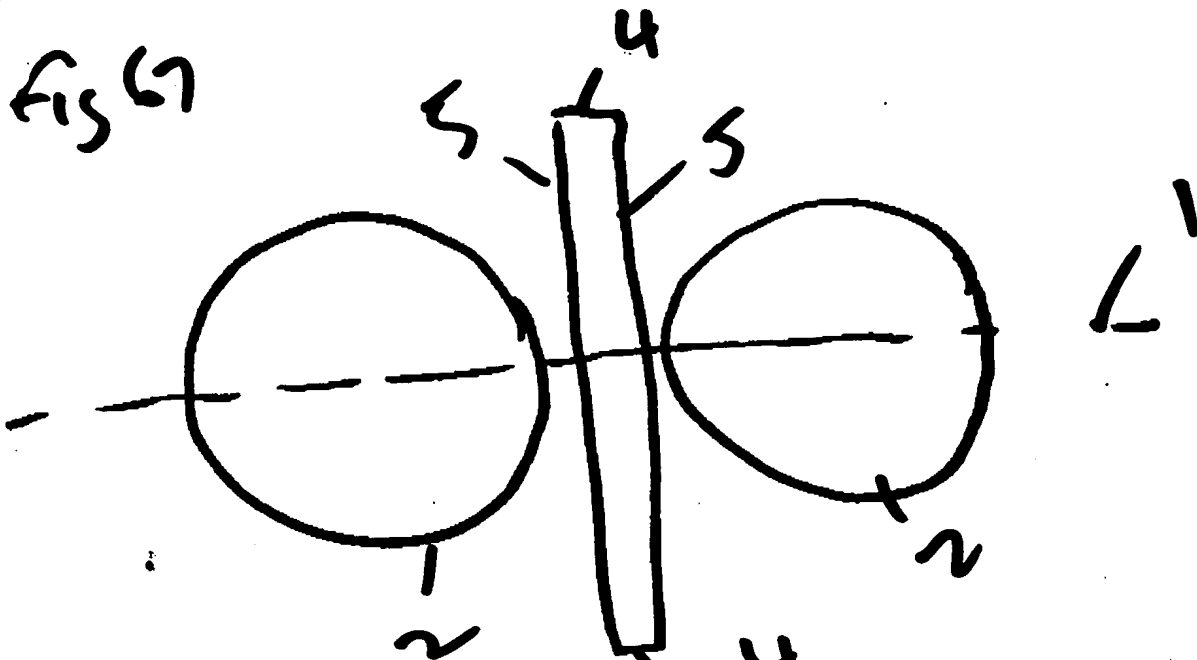


fig 68 →

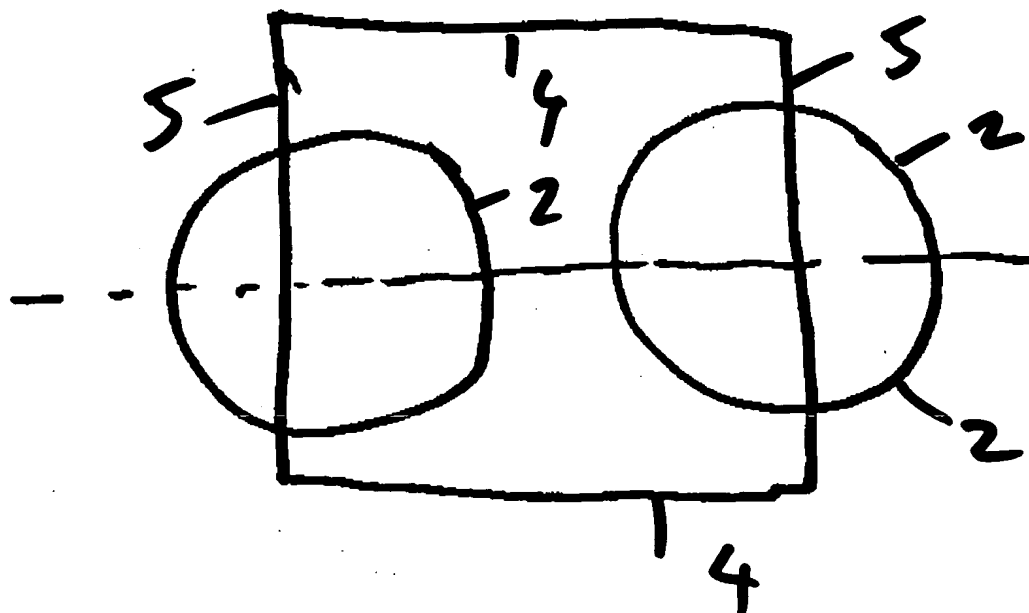


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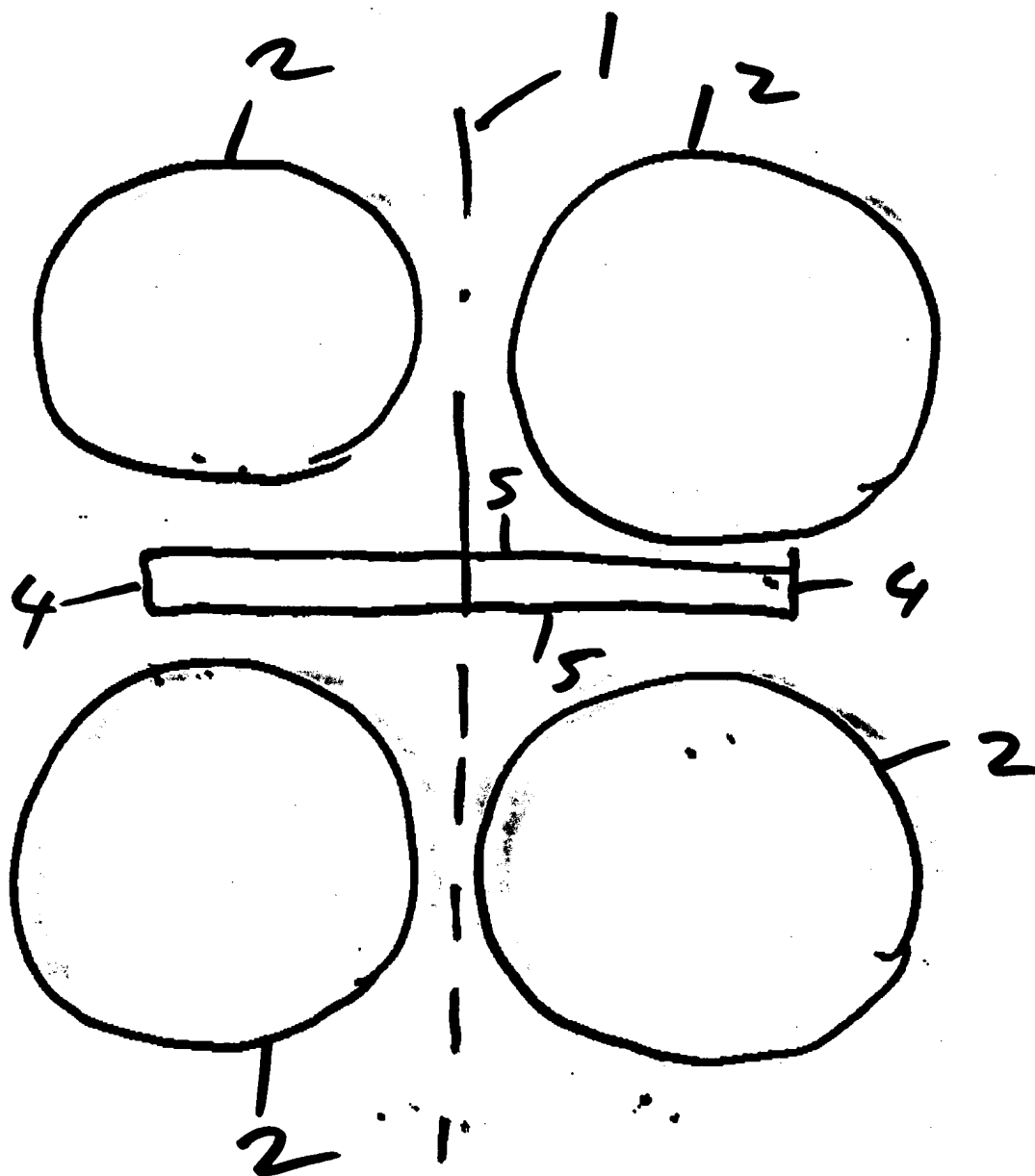
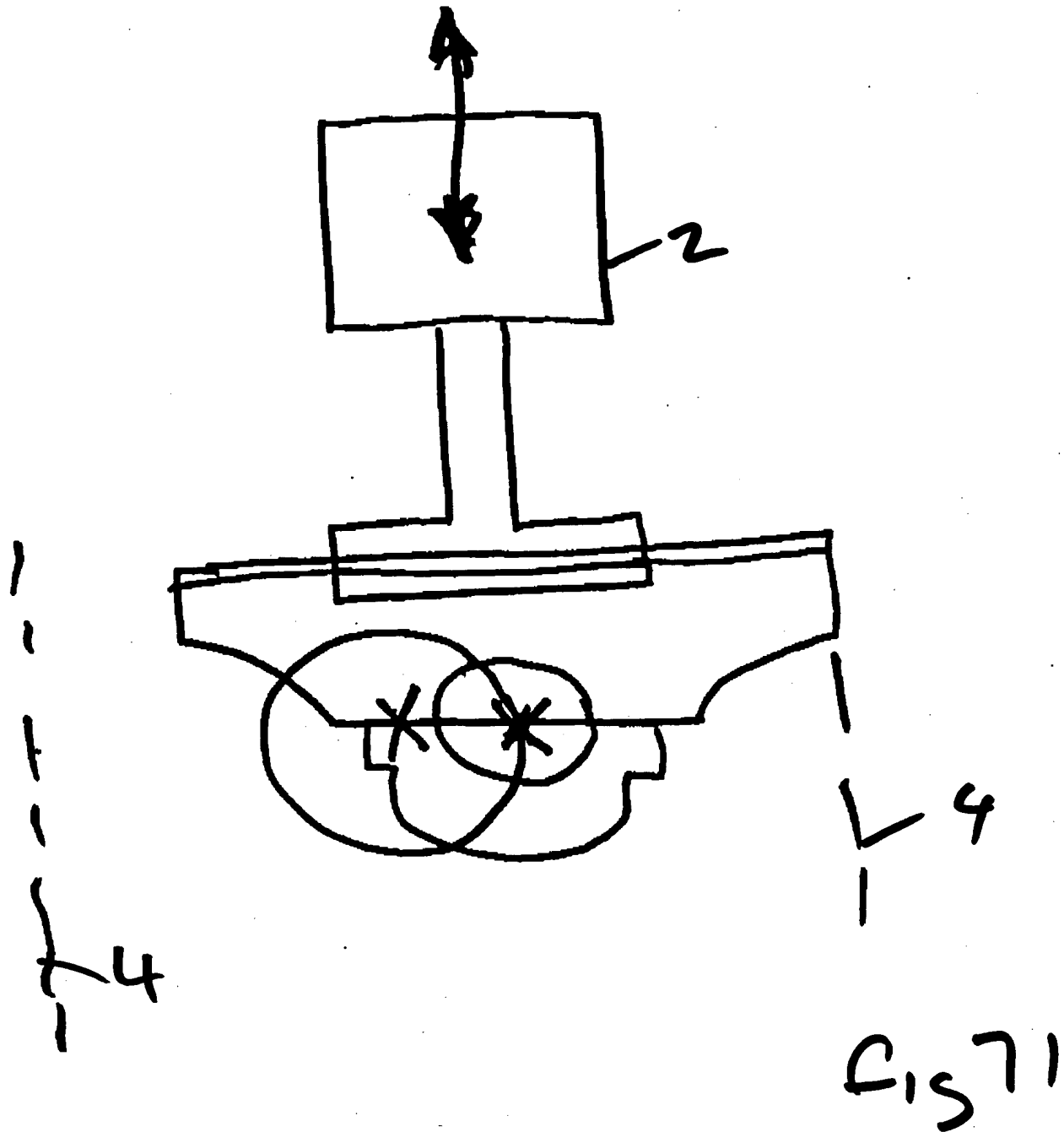


fig 70



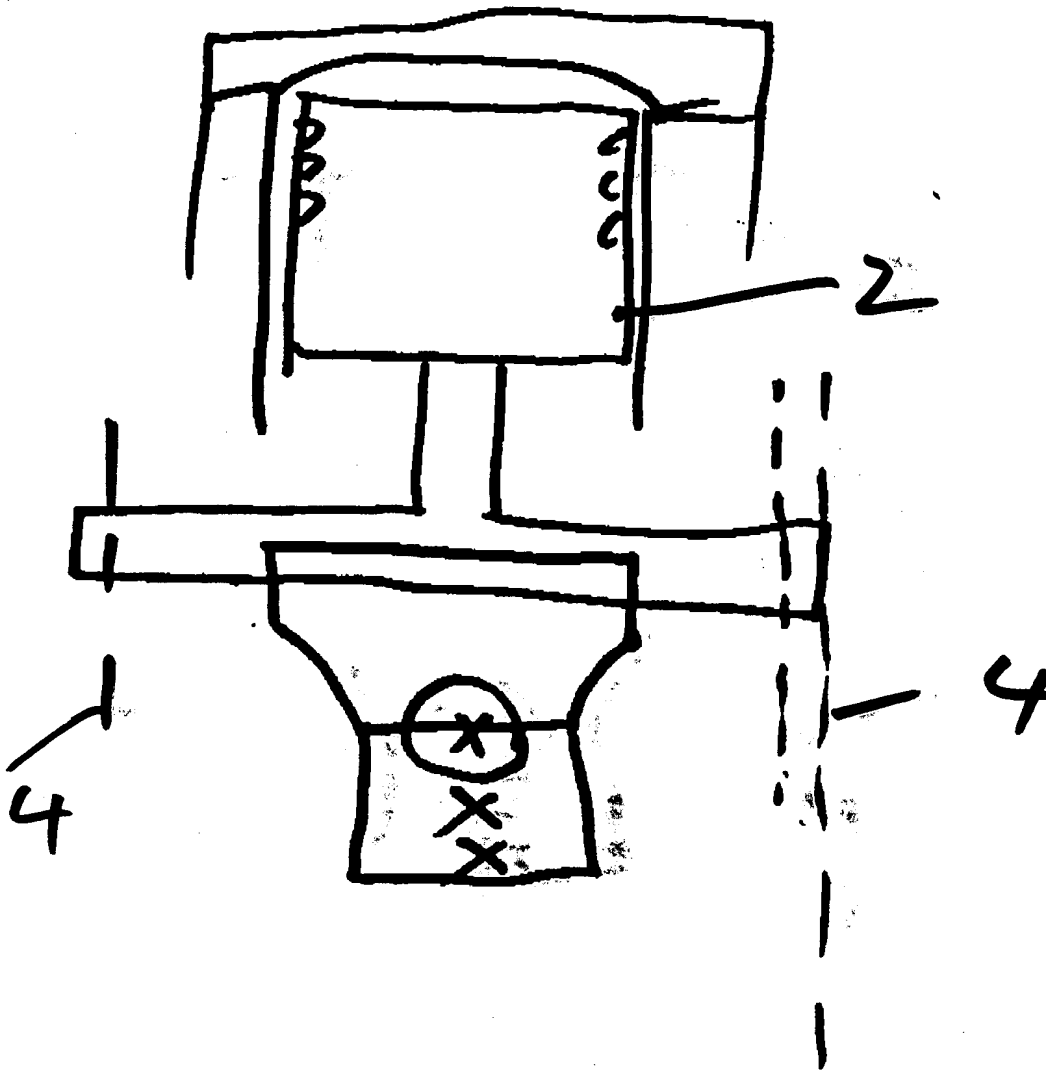
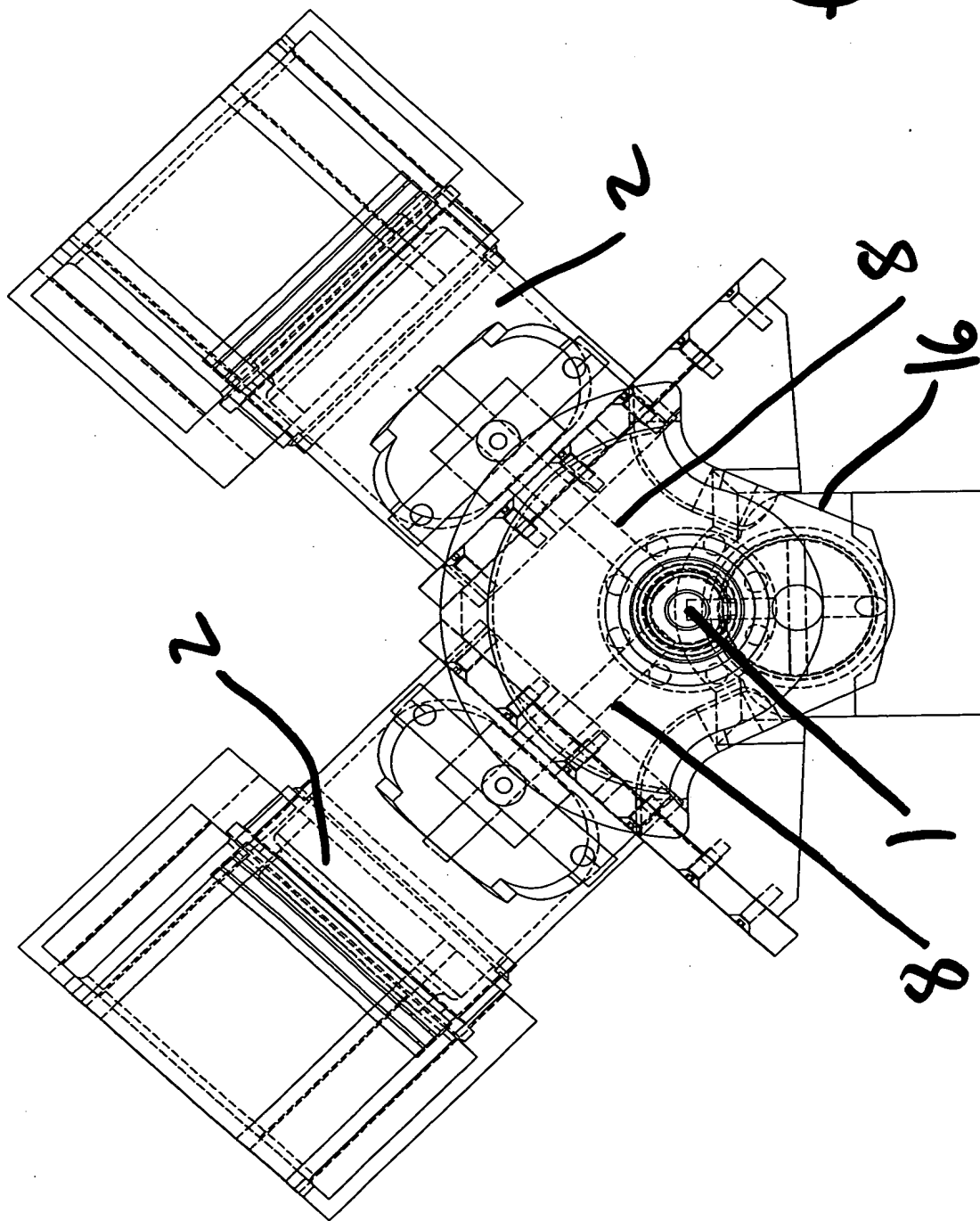
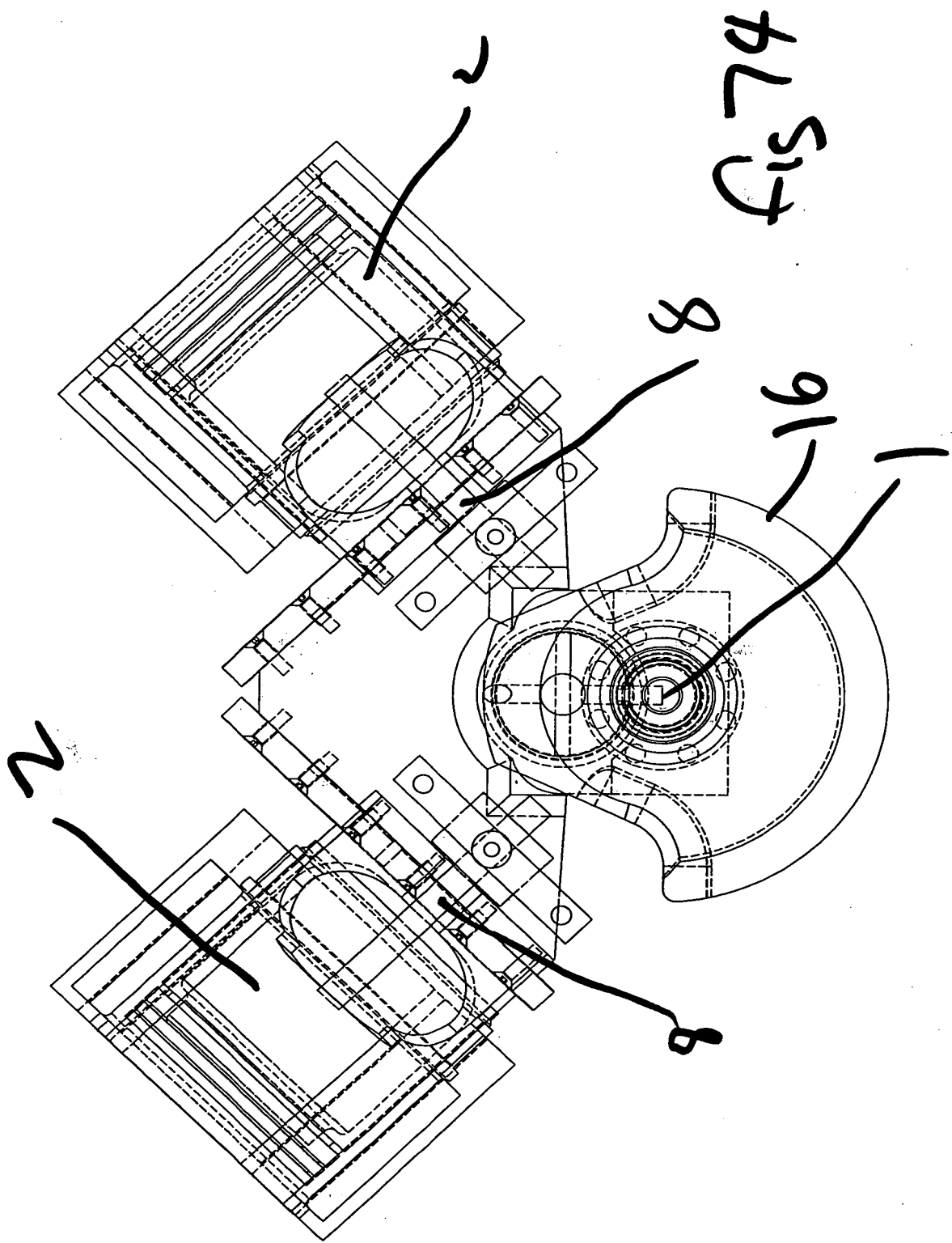


Fig 72

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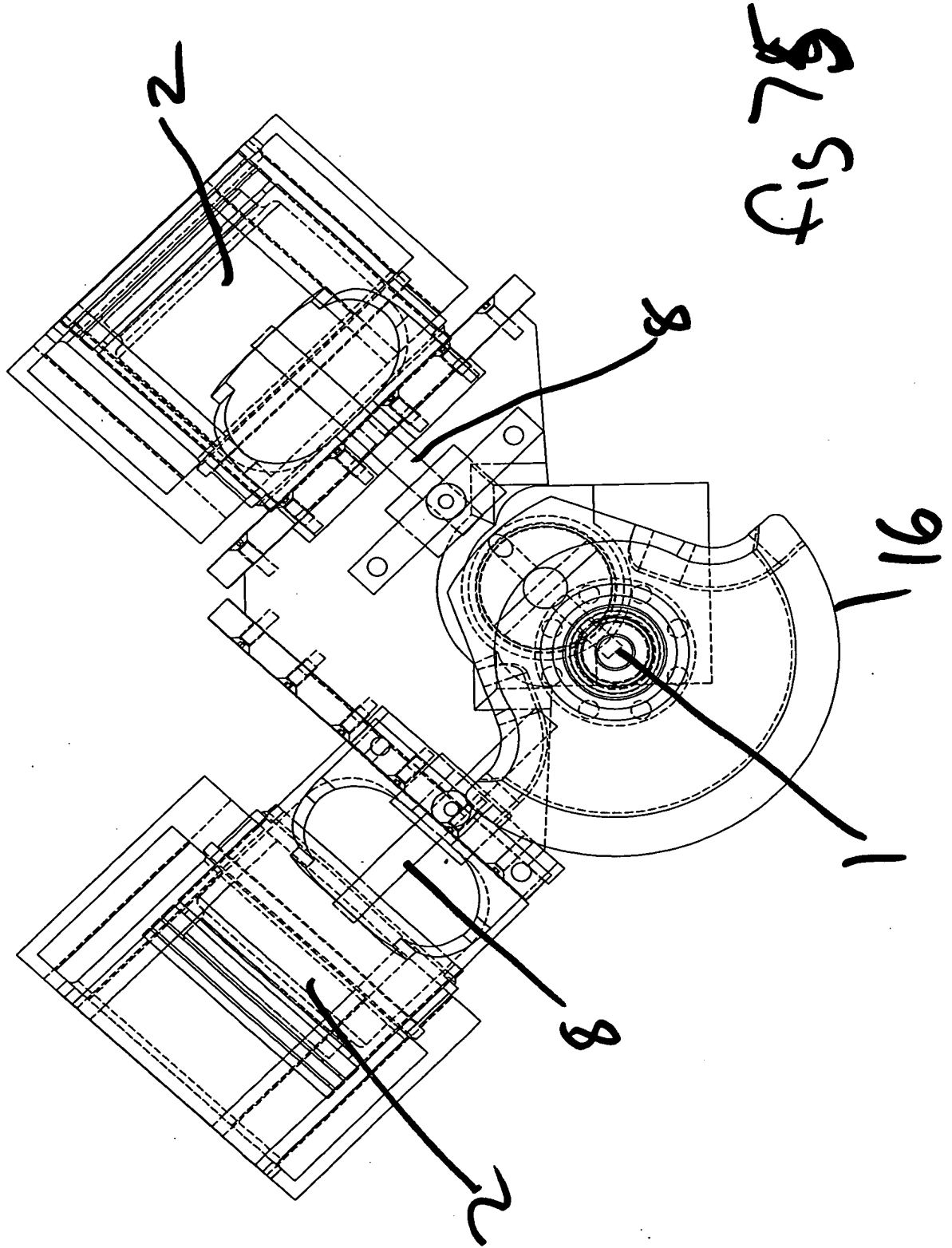


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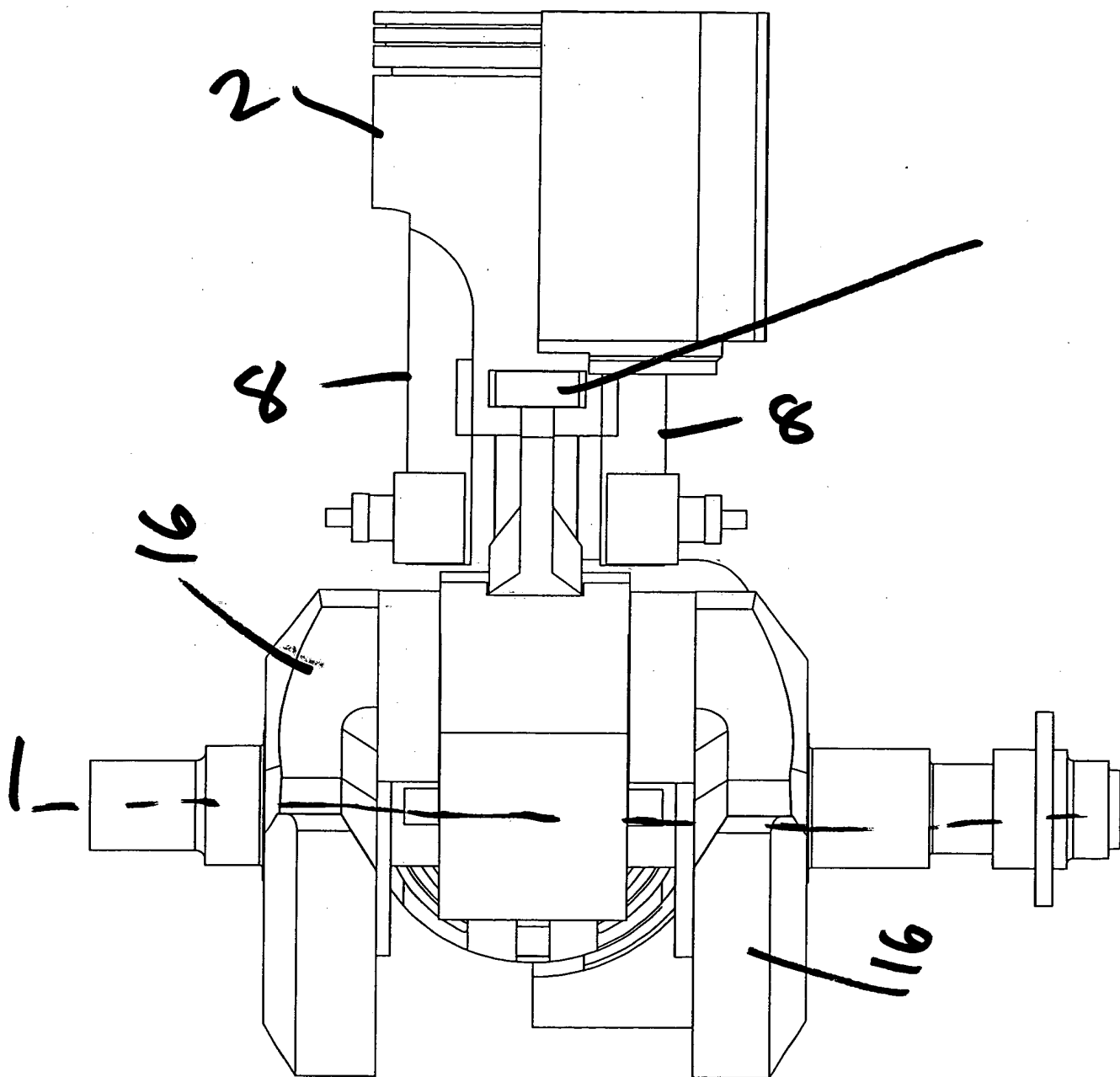


fig 76

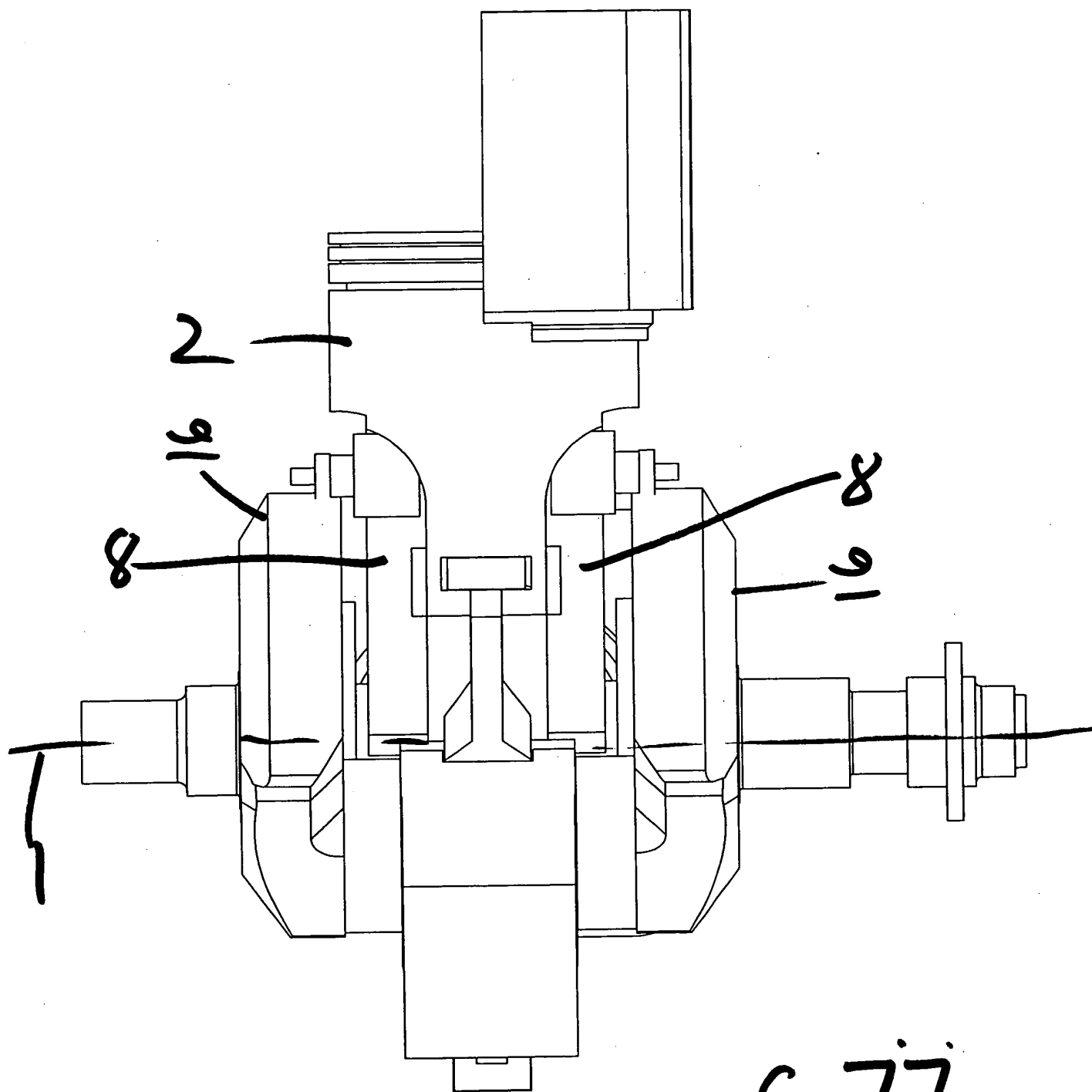
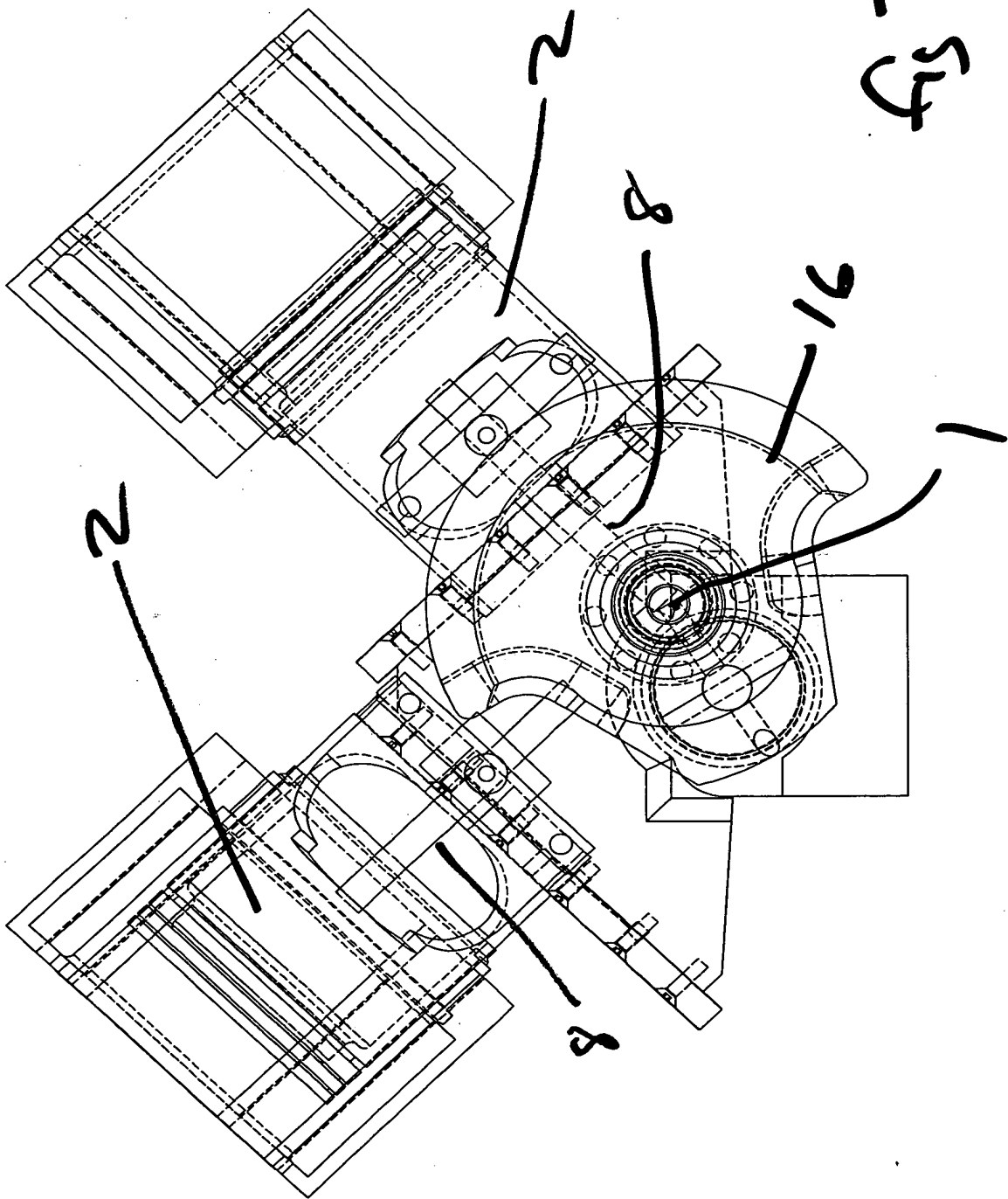


fig 77

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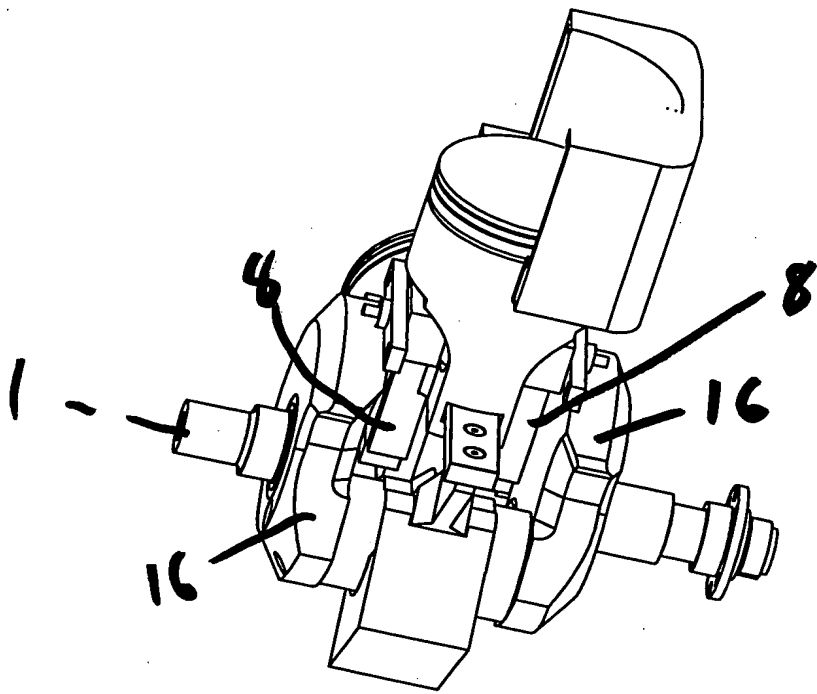


fig 78

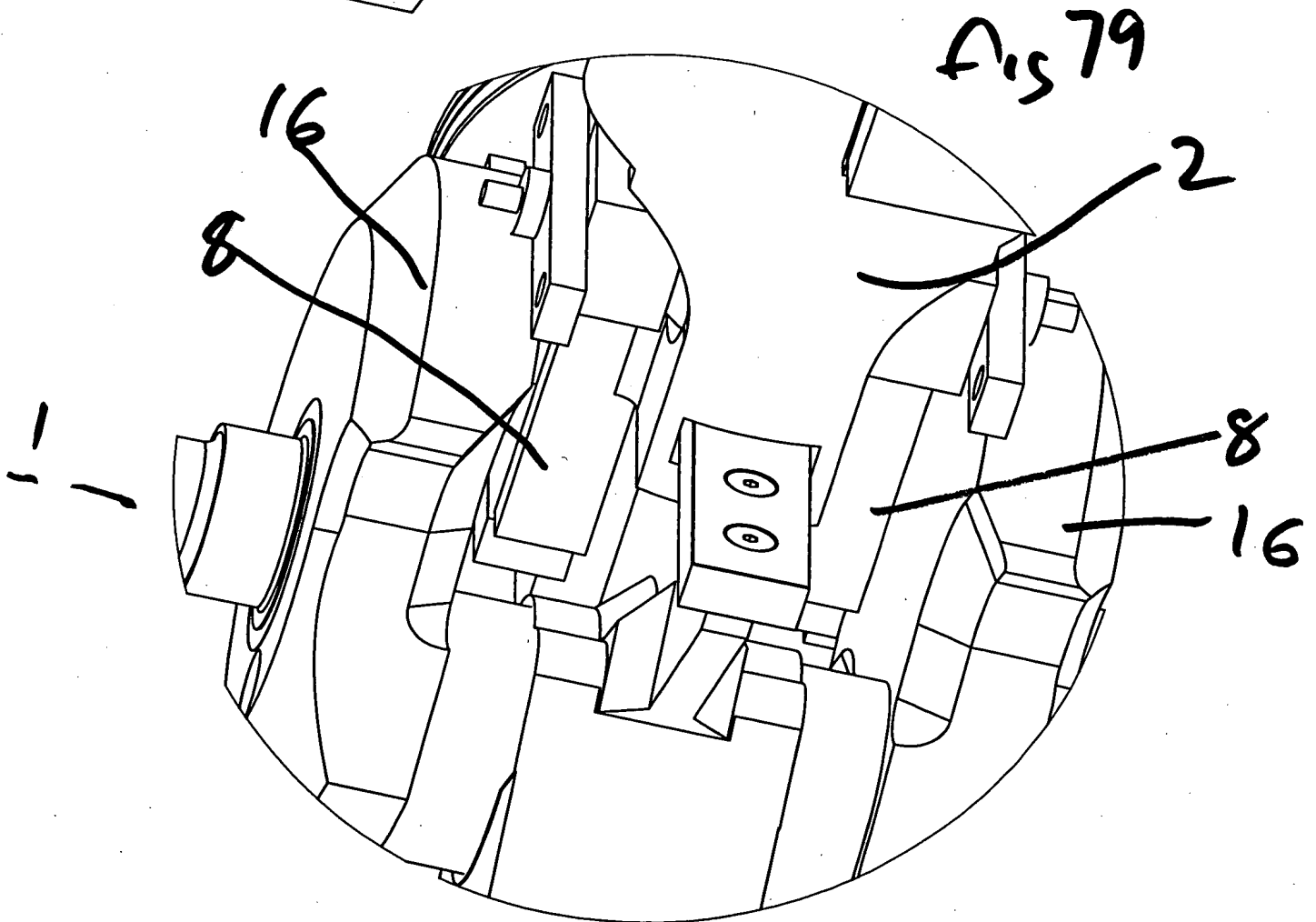
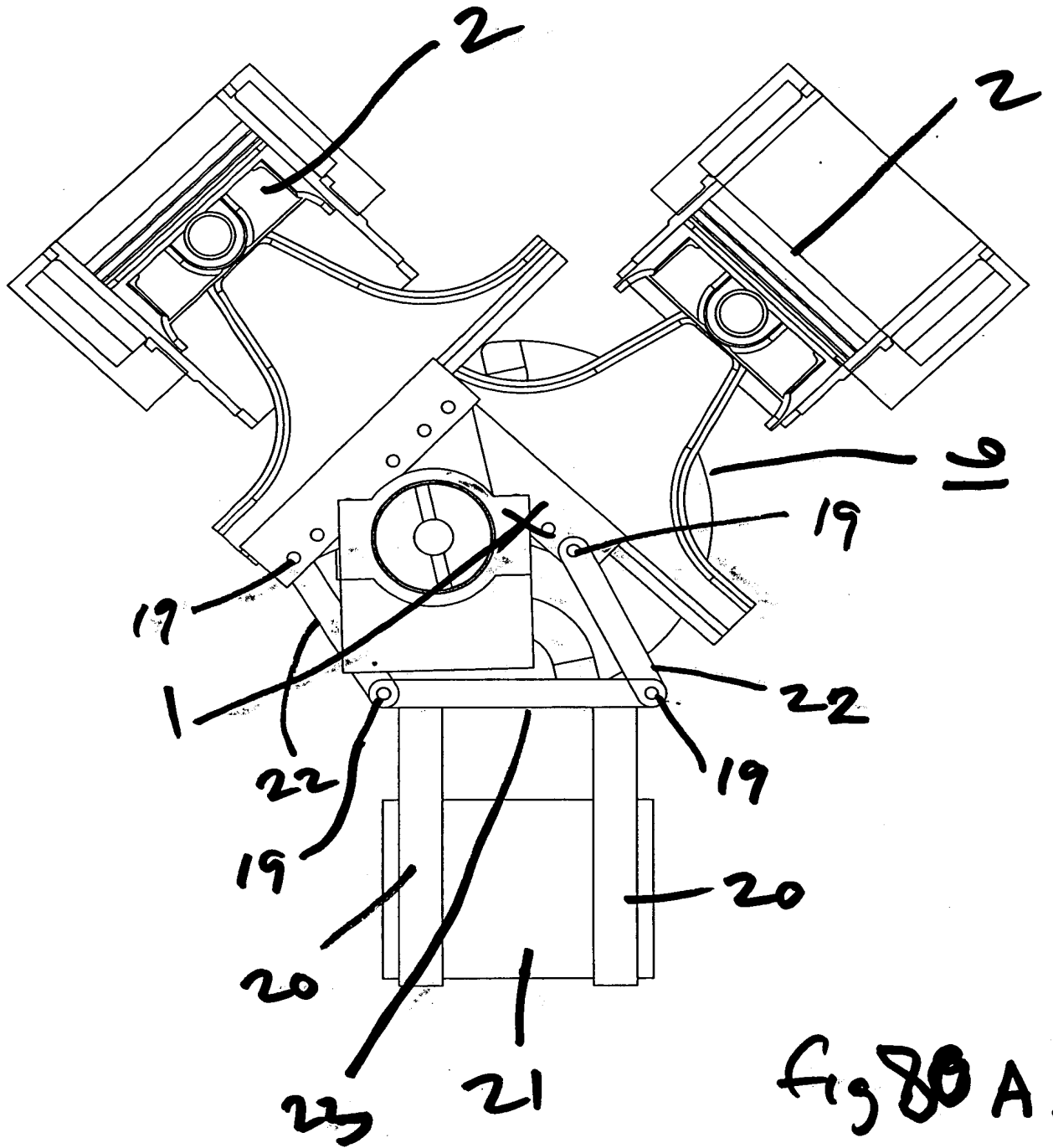


fig 79



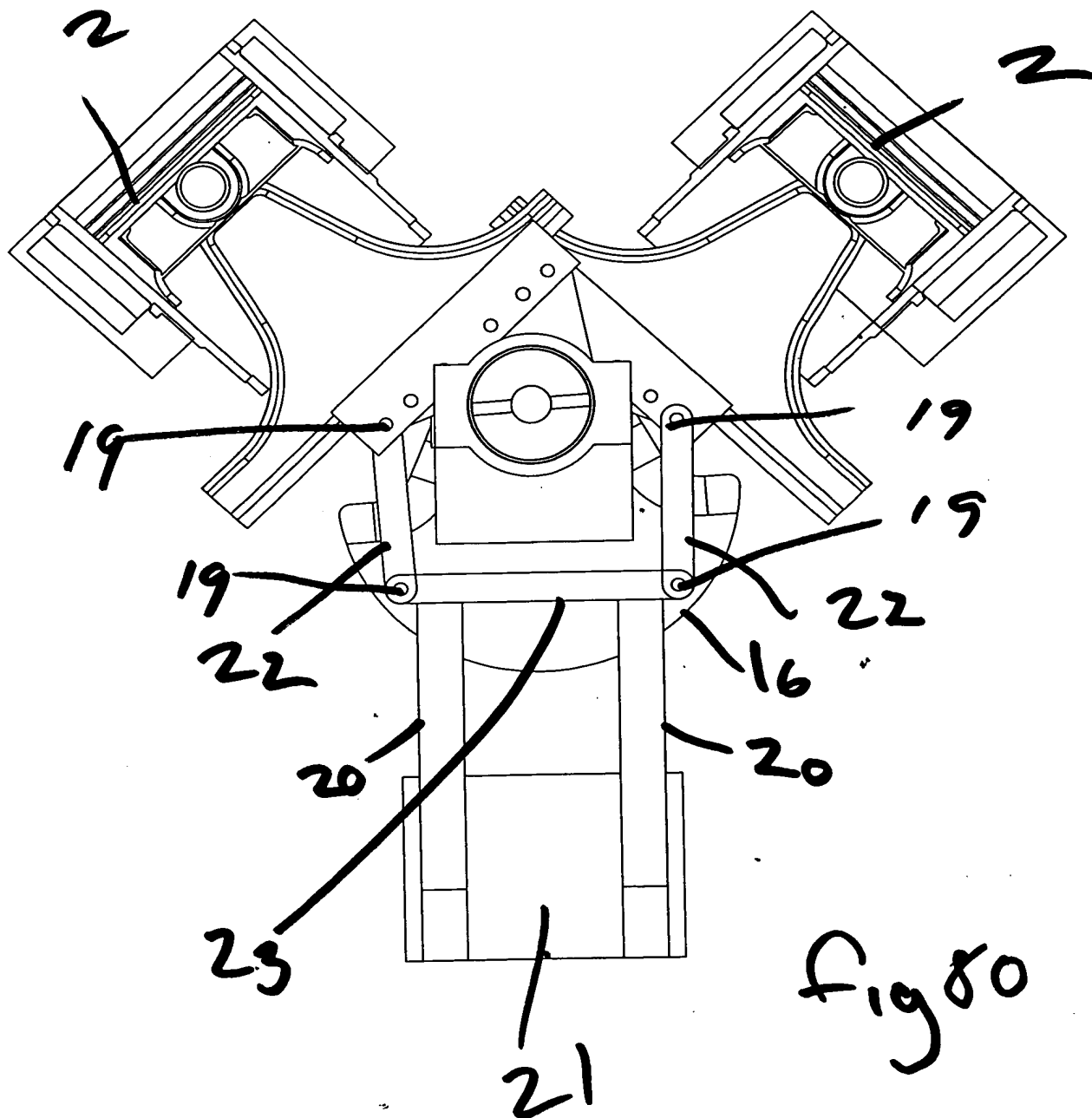
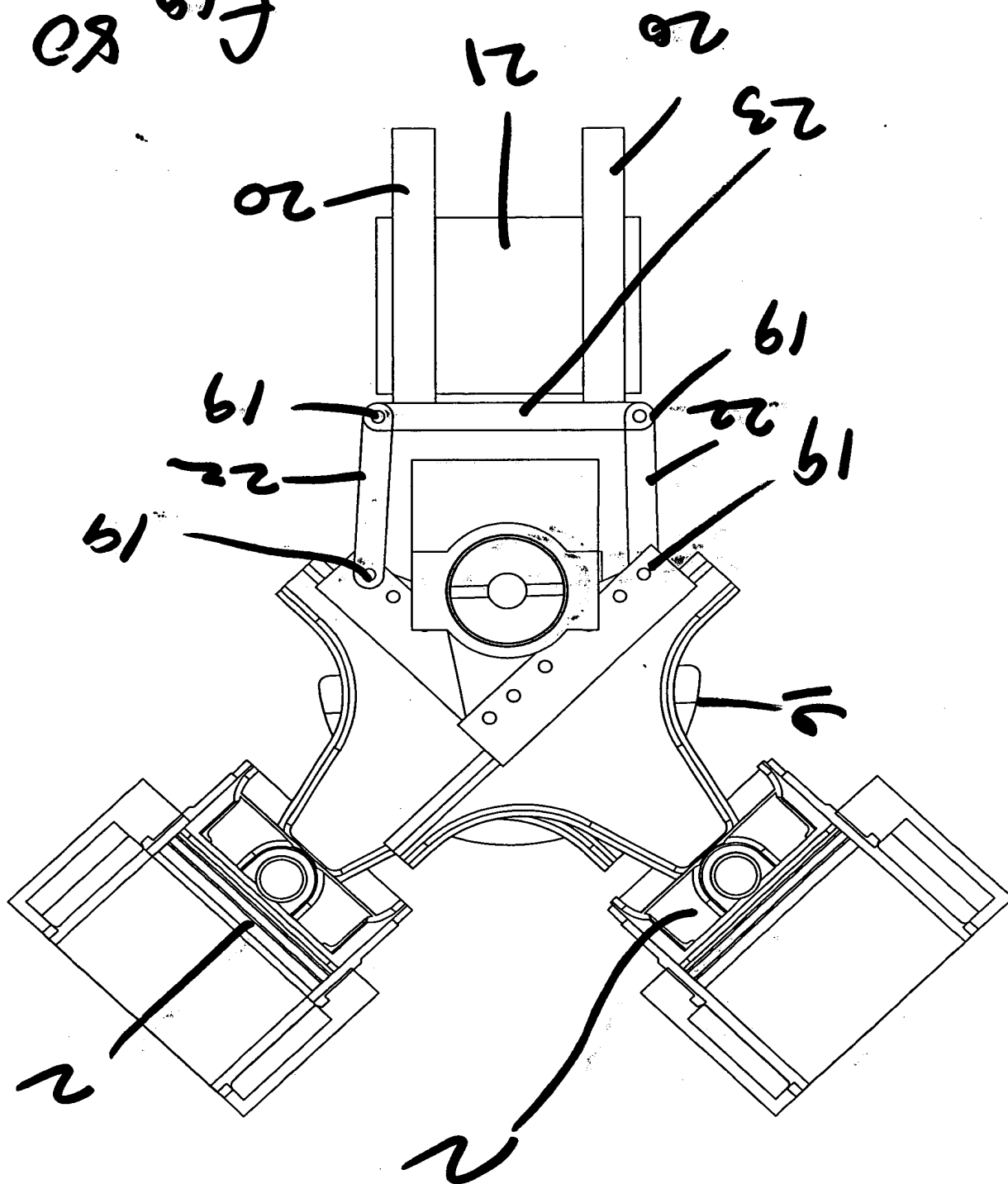


Fig 80



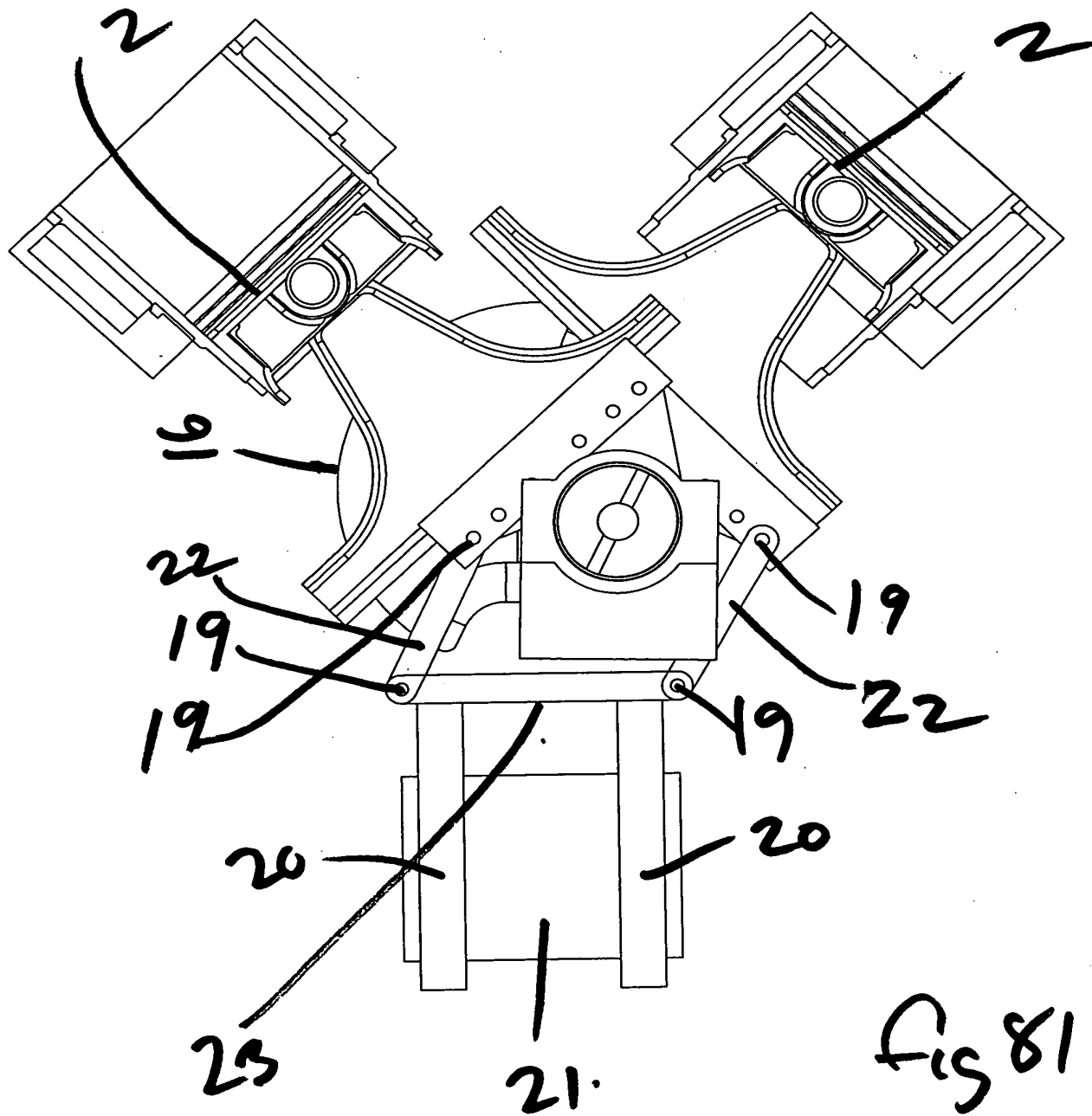
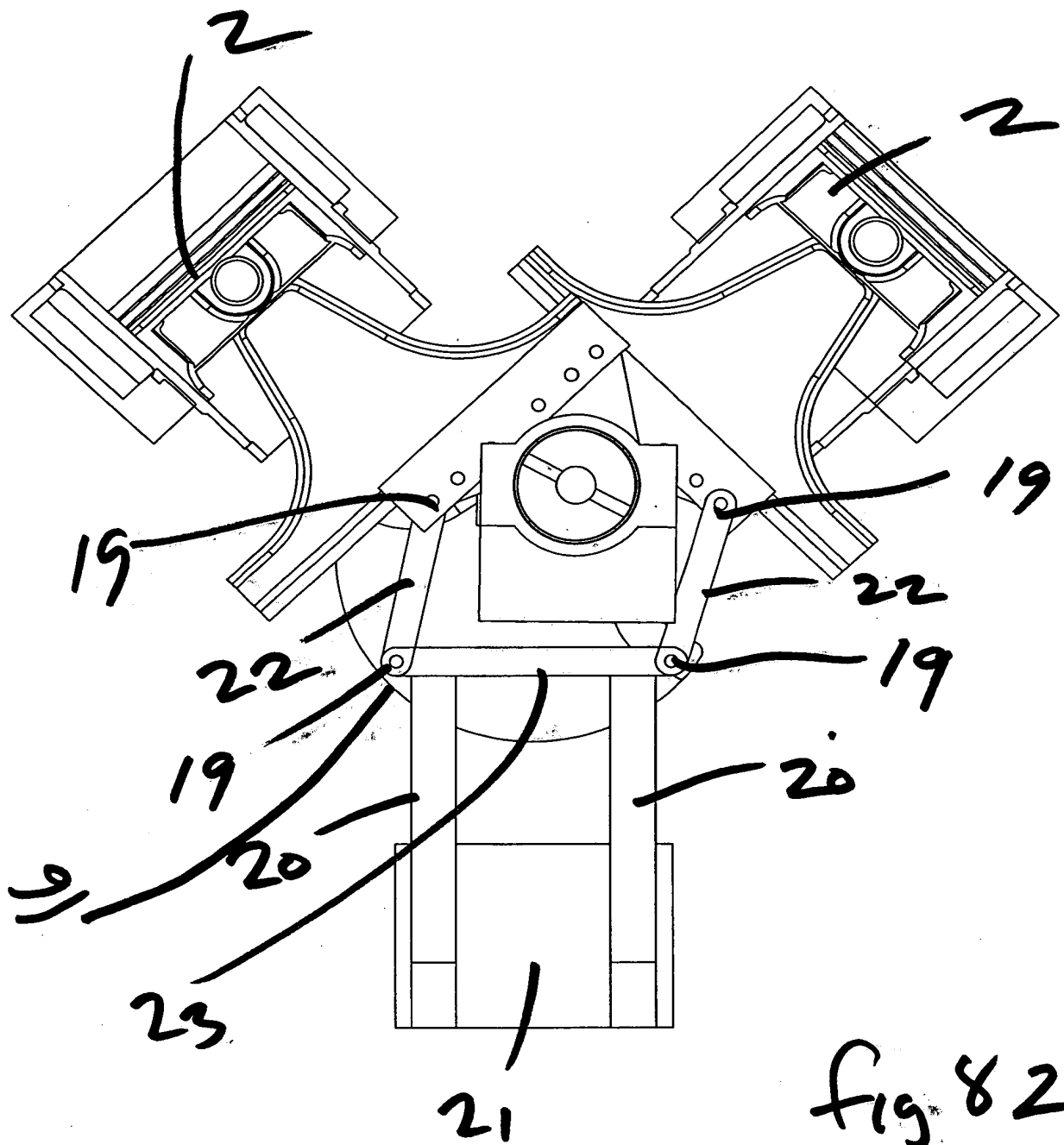


fig 81



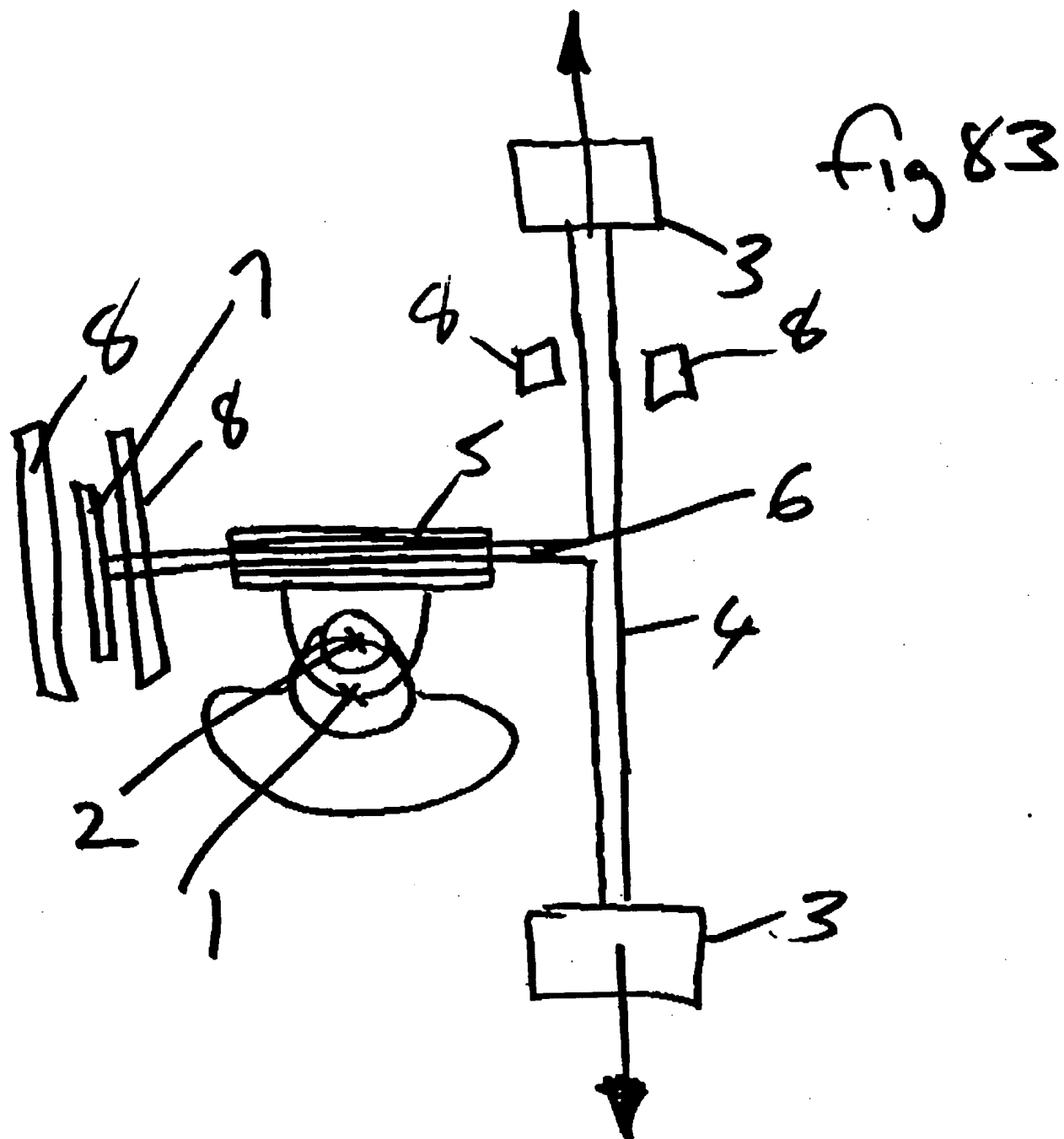


fig 84

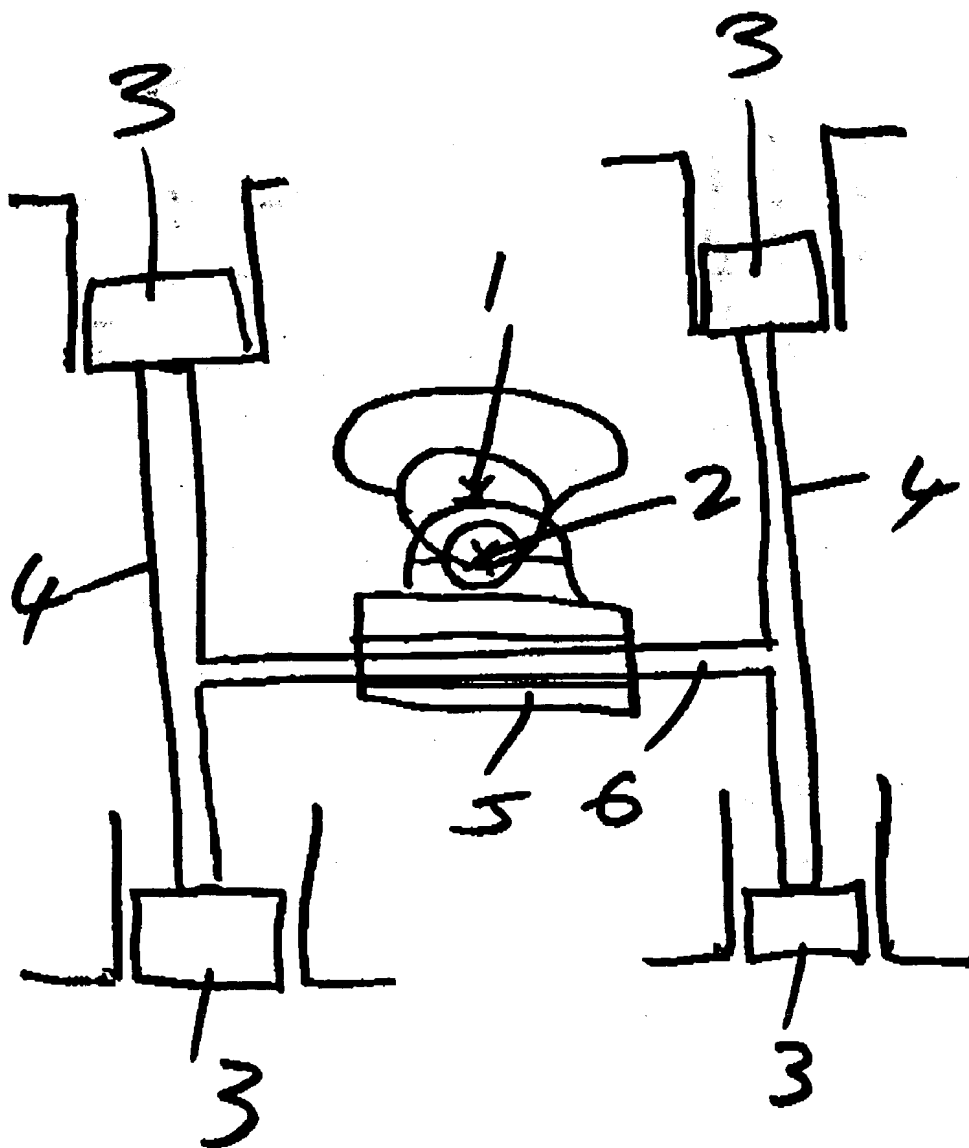


fig 85

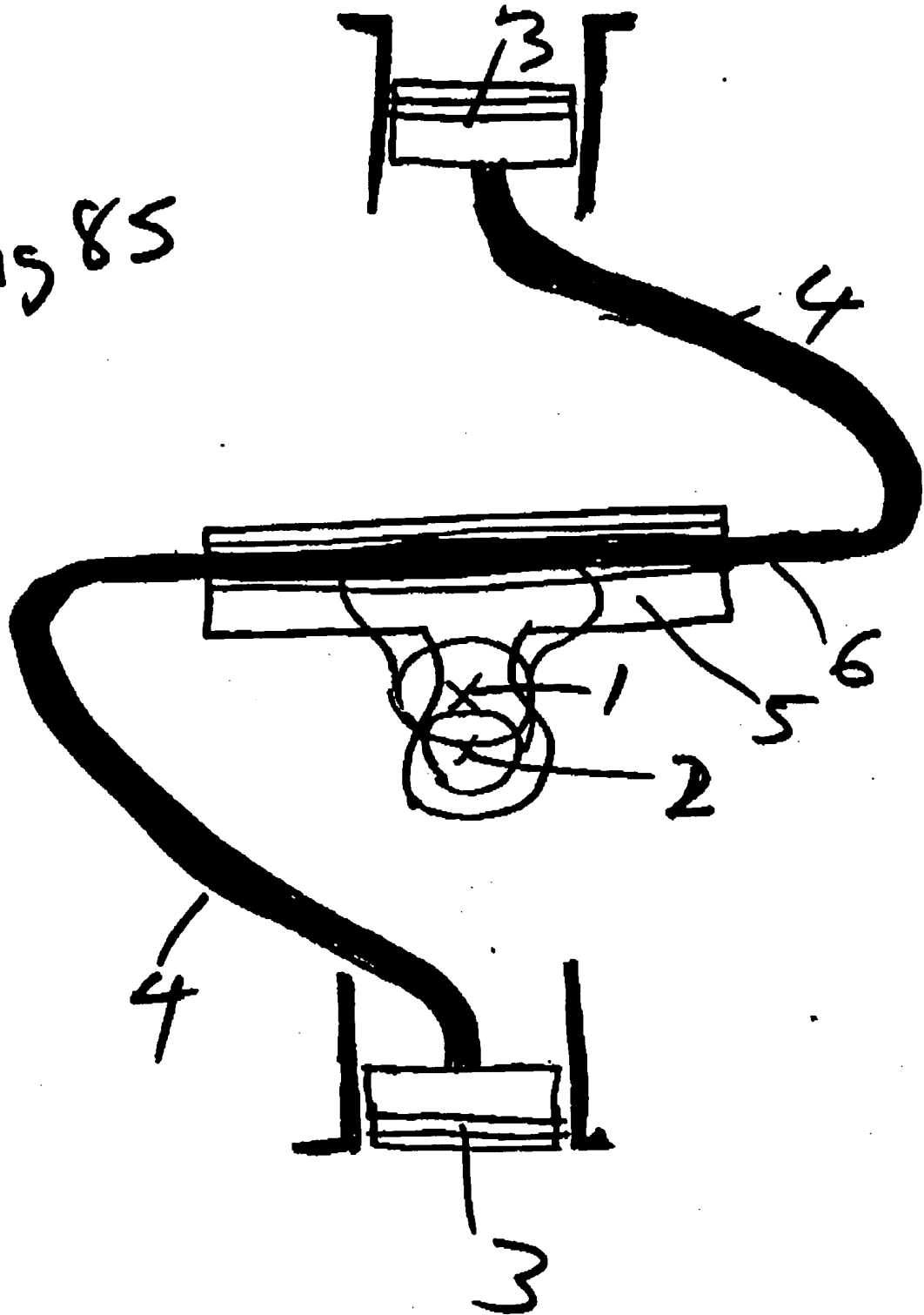


fig 87

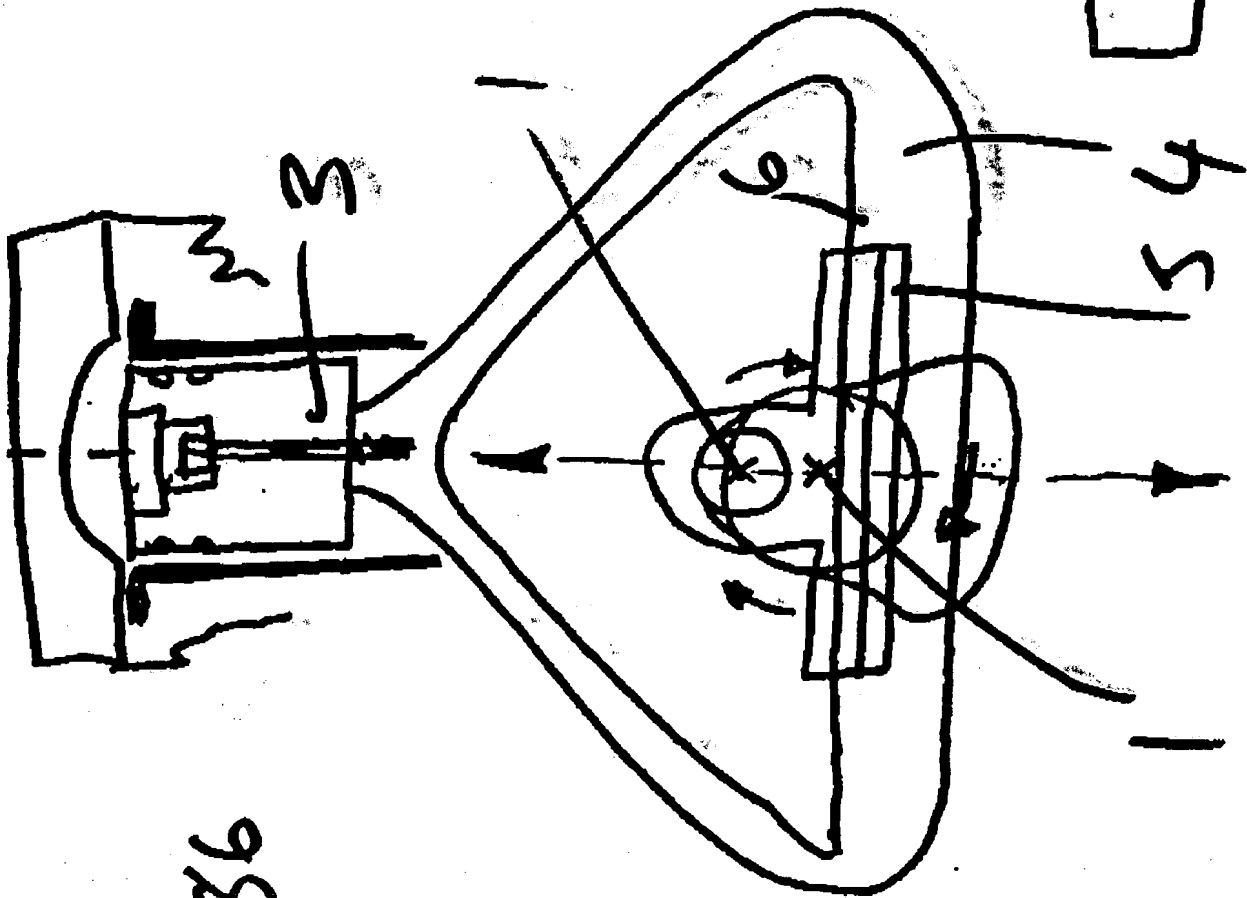
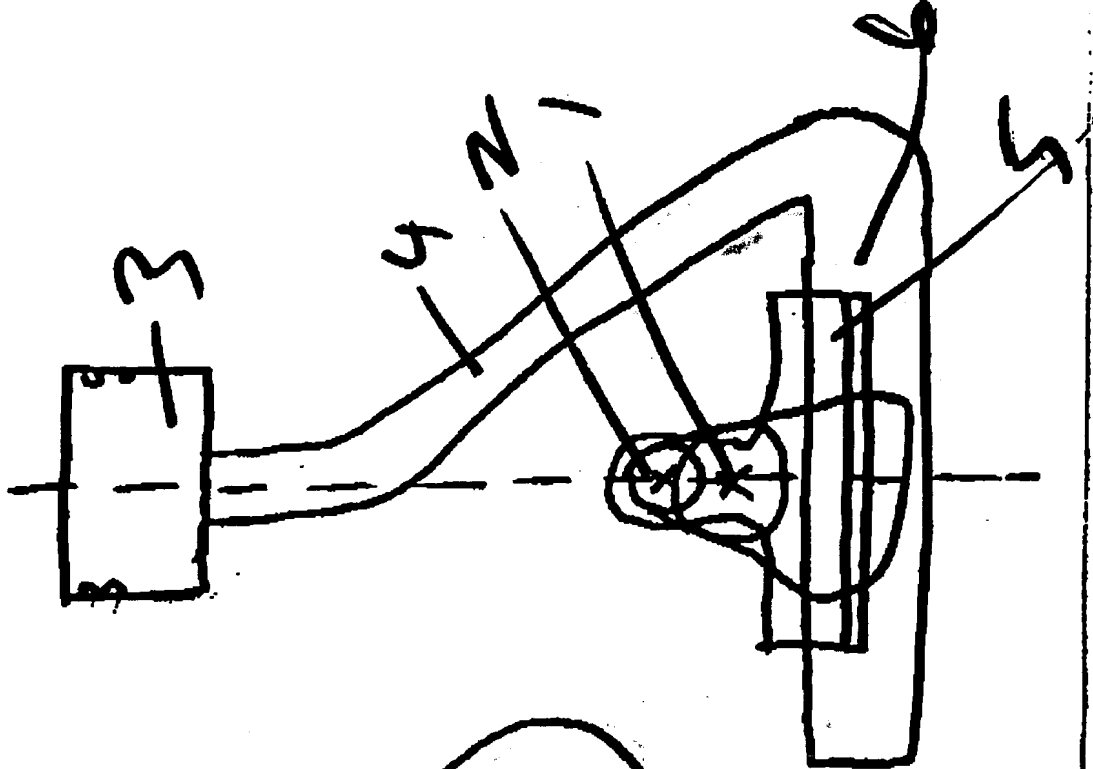
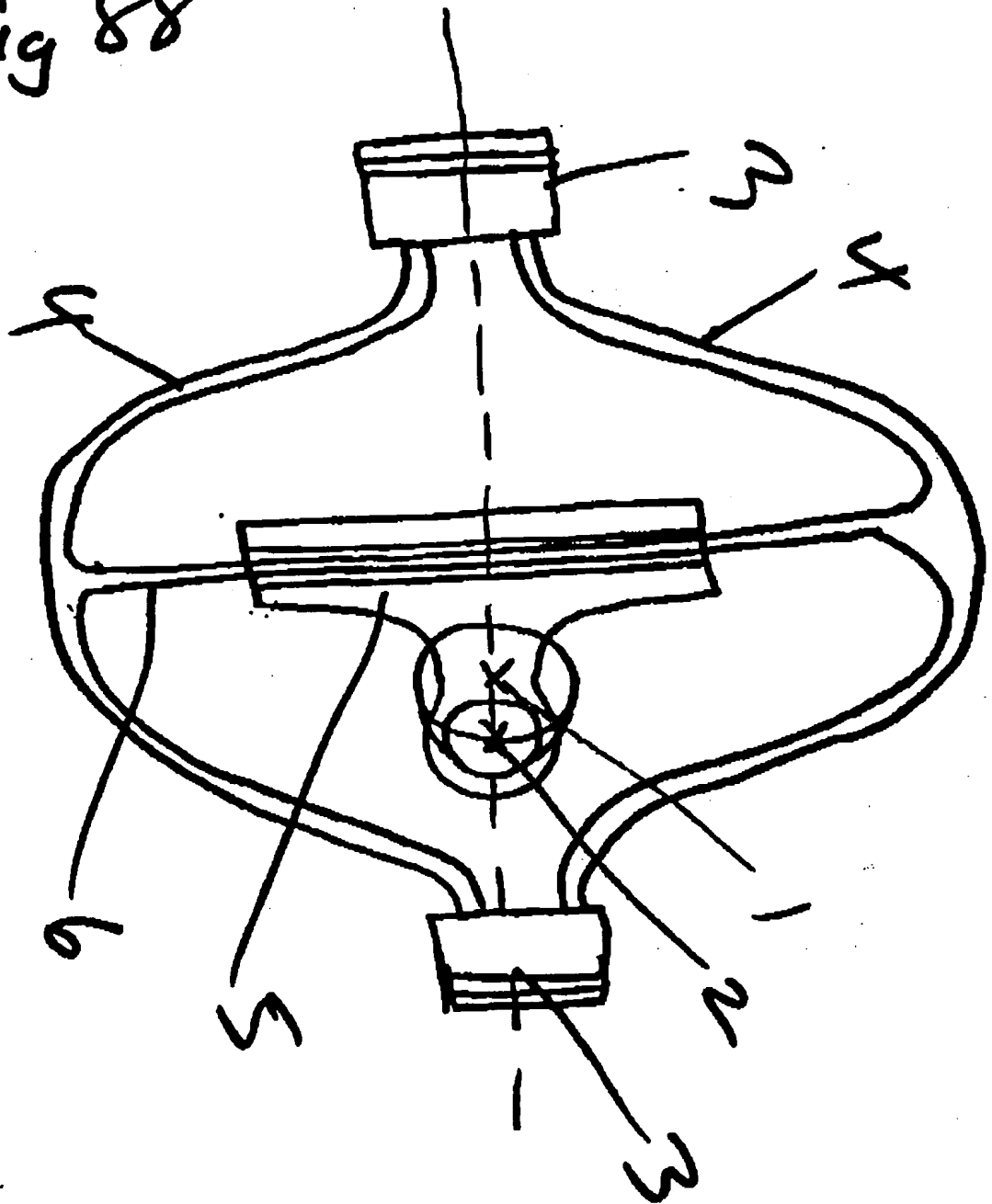


fig 86

Fig 88



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